THE IMPACT OF MACROECONOMIC SURPRISES ON INDIVIDUAL STOCK RETURNS IN SOUTH AFRICA

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DECLARATION

I, Vuyokazi Majija, declare that this research report is my own, except where otherwise indicated, referenced and acknowledged. It is submitted in fulfillment of the requirements for the degree of Master of Management in Finance and Investment at the University of the Witwatersrand, Johannesburg. This research report has not, either in whole or in part, been submitted for any degree, diploma or examination in this or any other universities.

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Signed at _____

On the _____ day of _____ 20 __

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ABSTRACT

This research report explores how various macroeconomic surprises impact on individual stock returns in South Africa. The focus of the study is on the individual constituent stocks of the FTSE/JSE Top 40 Index listed during the period January 2005 to December 2015. This report employs an event study and Bayesian Vector Autoregressive (BVAR) analysis approach to provide comprehensive insights into the relationship between the macroeconomic surprises and the individual stock returns in South Africa.

This study closely mirrors a previous study conducted by Gupta and Reid (2013) which explored the impact of five macroeconomic surprises on general stock market indices (ALSI and JSE Top 40) and industry-specific stock returns in South Africa. However, in the interests of completeness and robustness, there are a few material differences and additional innovations introduced in this report.

The event study results show that individual stock returns in South Africa are highly sensitive to GDP growth and CA surprises. Upon immediate impact, the GDP growth shocks cause negative stock returns indicating that initially market participants have a general dislike for the surprise element in GDP growth surprise announcements. However, post immediate impact, the stock returns increase and remain positive in line with widely hypothesized economic theory. In addition to GDP growth and CA surprises, the BVAR analysis indicates that USFed shocks have significant dynamic effects on individual stock returns in South Africa. The study finds that individual banking stocks and resource stocks are significantly sensitive to REPO surprises, whilst individual retail, property and consumer goods stocks are very responsive to GDP growth shocks.

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1 CHAPTER 1: INTRODUCTION

In finance, it is important to understand what leads to movements in the stock markets, both generally and in specific sectors, in order to manage funds profitably (Gupta and Reid, 2013). The relationship between “macroeconomic surprises” and movements in the stock markets is a major concern for analysts, investors, portfolio managers and fund managers as it influences their investment strategies when seeking to minimise risks and maximise portfolio returns.

Stock prices are affected by adjustments in expectations to the changing economic conditions driven by macroeconomic news announcements, such as GDP output, employment and inflation surprises, amongst others (Frijns et al. 2015). Studies by Bernanke and Kuttner (2005), Boyd et al. (2005), Brenner et al. (2009) who analysed the stock markets, have shown that macroeconomic news announcements are linked to changes in stock prices.

The reaction of the stock market to macroeconomic surprises can have a profound impact on the economy as stock markets form an integral part of the monetary transmission mechanism through which monetary policy affects the real economy. In terms of the wealth effect, macroeconomic surprises that negatively impact stock market valuations (I.e. a surprise increase in interest rates) will reduce households’ wealth, discourage private consumption, and adversely affect real economic growth. It is important for policy makers to understand the stock market channel and the impact of their policy decisions in order to monitor and effectively conduct monetary policy.

The stock market generally reflects the underlying conditions of the economy, therefore stock prices help in predicting output and inflation by acting as a lead indicator of economic activity (Forni et al, 2003; Stock and Watson, 2003). Gupta and Hartley (2013) recently showed the importance of stock prices in forecasting inflation and output in South Africa. Accurate predictions of how stock prices react to macroeconomic shocks are important for policy makers since they provide a basis for relevant policy decisions in advance.

Stock markets play an important role in financial markets as they provide an investment platform for investors, facilitate price discovery in financial assets and improve stock liquidity (the ability to trade stocks easily). According to Bencivenga et al. (1996) and Levine and Zervos (1996), stock market liquidity is crucial for economic growth. Stock markets serve as a funding avenue to capitalise businesses thereby allocating capital to the corporate sector. Well capitalised and successful businesses have a real effect on the aggregate economy and sustain economic growth.

Many past studies have focused on the relationship between macroeconomic variables and general aggregate stock market indices. However, very little research effort has been dedicated to how macroeconomic variables influence individual stocks at the firm level.

In financial markets, a sensitivity analysis focused on individual stocks is crucial for individual stock selection, especially for short term speculators who trade and seek to profit on short term market movements. In order to make substantial short term profits, speculators must accurately predict how individual stocks will react to different macroeconomic surprises and correctly identify profitable trading opportunities. Speculative traders have a bad reputation in the investment industry; however they perform an important role in the economy by eliminating short-term mis-pricings in the stock market.

In an uncertain macroeconomic environment where asset managers and portfolio managers are concerned about the negative effects of macroeconomic shocks on stock portfolios, it is crucial to know which individual stocks to avoid. A study focusing on how individual stocks react to macroeconomic surprises will benefit portfolio risk management by guiding asset managers in building defensive and well-diversified portfolios. Defensive portfolios include defensive stocks that preserve principal values, regardless of market conditions. These are stocks in companies relatively unaffected by business cycles. Well-diversified portfolios contain a large number of individual stocks that are generally uncorrelated with each other and combine to form low-risk portfolios. The American economist, Harry Markowitz, asserted that portfolio risk is reduced by diversifying across

assets as long as the returns of the combined risky assets are not perfectly positively correlated (Markowitz and Fabozzi, 2002).

As part of the bottom-up investment approach that focuses on individual stocks or specific companies rather than the industry in which the companies operate, it is important to understand how company-specific characteristics such as differences in gearing or capital structure would lead to different sensitivities to macroeconomic shocks. For example, one would expect the stock returns of highly geared companies to be more sensitive to monetary policy shocks (or interest rate surprises) than the stock returns of relatively low geared companies within the same industry. By focusing on individual stocks, this study provides insights into how different company-specific characteristics can result in similar companies within the same industry reacting differently to the same macroeconomic shocks.

According to Jefferis and Smith (2005), the Johannesburg Stock Exchange (JSE) in South Africa dominates other African stock markets in terms of sophistication and size, as measured by market capitalisation. Jefferis and Smith (2005) reported that at the end of 2003, the JSE had a market capitalisation of US $267 billion, making South Africa the fifth largest emerging market (after China, Taiwan, South Korea and India) and the 18th largest stock market in the world. Due to its significance in Africa, emerging markets and world financial markets, the individual stocks listed on the JSE are the main focus of this study. The scope of this study is restricted to the constituents of the FTSE/JSE Top 40 Index (JSE Top 40), of which the index ticker symbol is J200. This index contains the 40 largest companies listed on the JSE, ranked by market capitalisation. The constituents of the JSE Top 40 are an important consideration for this study as these stocks commonly form the core stock holdings of well-diversified equity portfolios held by long term investors in South Africa. The portfolio construction technique called “Core: Satellite” portfolio strategy is becoming increasingly popular amongst investment managers worldwide. For example, in South Africa, Nedbank Private Wealth utilises the Core: Satellite portfolio strategy for its equity asset allocation. The Core part is invested “in line with the equity house view which is an actively managed, rigorous, valuation-driven process that seeks to identify a

portfolio of quality companies intended to be held for the long term" (Nedbank Private Wealth, 2016). The Core part is benchmarked against the FTSE/JSE SWIX40, of which the index ticker symbol is J400. The JSE SWIX40 (J400) is the shareholder weighted Top 40 Index which closely follows the construction of the JSE Top 40 (J200) but is adjusted to reduce the constituent weights for foreign shareholders in these stocks and is adjusted to reduce the weightings of mainly resource and dual-listed stocks in the JSE Top 40 Index. Many other professional investors and investment houses are now using Core: Satellite strategies, including pension fund managers, wealth managers and asset managers (iShares, 2016).

Since the JSE Top 40 stocks form the Core part of many investment portfolios that are held for the long term, it is important for long term investors to understand the sensitivity of each individual stock to macroeconomic surprises to avoid panic and to resist investor short-termism which is the frequent turning over of investment positions based on current news or short term market noise. According to Stenner (2016), one of the most dangerous of all investor behaviours might be called "short-termism." Short-termism leads to many problems, for example frequent short term trading resulting in high rates of portfolio turnover associated with high trading costs that ultimately erode gains and harm investor returns in the long term.

A study focusing on individual stock returns will add value to investors following an active investment strategy as opposed to a passive-index investment strategy. An active investment strategy looks to outperform the market by building a high conviction stock portfolio of uncorrelated, quality individual stocks; whilst a passive-index investment strategy picks an index fund that follows and tracks the stock market index.

Owing to the pivotal role stock markets play in financial markets and economic development, a study on the impact of macroeconomic surprises on individual stock returns in South Africa will be useful to speculative traders, analysts, long term investors, portfolio managers, fund managers and policy makers.

The findings of this research report provide three direct benefits to the South African financial markets. Firstly, short term speculators will have a basis to exploit arbitrage

opportunities in individual stocks resulting from macroeconomic surprises and eliminate mis-pricings in the stock market. Secondly, long term investors and portfolio managers making use of comprehensive analysts' reports will have a better understanding of how various macroeconomic surprises impact individual stocks, consequently avoiding short term noise trading and making well-informed long term investment decisions that ultimately benefit the broad economy. Lastly, policy makers will gain a deeper understanding of how local and US monetary policy decisions impact individual stocks on the JSE.

Despite the potential contributions a study focusing on individual stock returns would add to speculative trading, active portfolio management, diversification strategies, bottom-up fundamental analysis and policy making in South Africa, there is still a scarcity of research studies devoted to how a wide range of macroeconomic surprises specifically impact the individual constituents of the JSE Top 40 Index in South Africa.

This research report closely mirrors a previous study conducted by Rangan Gupta and Monique Reid in 2013. They explored the impact of five macroeconomic surprises on the general stock market indices (ALSI and JSE Top 40) and industry-specific stock returns in South Africa. This report differs in three main ways from Gupta and Reid (2013). Firstly, the focus of this study is on the sensitivity of individual constituents of the JSE Top 40 (and not the general or sector-specific indices) to various macroeconomic surprises. Secondly, the macroeconomic "surprise" variables have been redefined to a more robust definition incorporating a variability or volatility measure for the forecasts. Thirdly, three additional regressors are introduced into this study to extend the analysis to several relevant macroeconomic surprises. The additional regressors include the market return, the oil price and the US Federal Reserve Rate surprises. These are deemed pertinent to the current South African stock market landscape.

The remainder of this research report proceeds as follows. Section II provides a detailed review of related literature dealing with the relevant relationships between stock returns and various macroeconomic variables. Section III describes the data and research

methodology used in the research report, it gives insights into how the “surprise” macroeconomic variables are constructed. Section IV presents the main empirical research results, and the final Section V contains the conclusion.

2 CHAPTER 2: LITERATURE REVIEW

The nexus between macroeconomic variables and stock returns has received a great deal of research attention in past studies. Fama (1981), Chen, Roll and Ross (1986), Ferson and Harvey (1991) have documented evidence that stock prices are driven by a range of macroeconomic variables. In theory, stock prices should be determined by their expected discounted cash flows. Therefore, macroeconomic variables that alter the pattern of future expected discounted cash flows are expected to have a significant effect on stock prices.

A wealth of research on the impact of macroeconomic variables on stock prices has focused on developed markets. However, as stock markets play an increasingly major role in developing markets especially in emerging markets, recent studies explore the impact of various macroeconomic variables on emerging market stock returns.

Past studies such as Smal and De Jager (2001), Hewson and Bonga-Bonga (2005), Bonga-Bonga (2009), Alam and Uddin (2009), Mallick and Sousa (2011) and Gupta and Reid (2013) were mainly focused on the impact of monetary policy and macroeconomic news on the South African general aggregate stock market and sector-specific stock returns. These past studies have added value as part of asset managers' top-down investment strategies that look at the broader economy and try to forecast which sector will generate the most profitable returns under various unexpected macroeconomic shocks. The question that still remains is which individual stocks in South Africa are significantly affected by monetary policy and a wide range of macroeconomic surprises? In past literature, empirical evidence on the impact of a wide range of macroeconomic shocks on South African individual stock returns remains thin.

2.1 The Relationship between GDP Growth and Stock Returns

Gross domestic product (GDP) is the most commonly used method of measuring the economic growth or economic performance of a country.

According to Statistics South Africa (2016), GDP is the total value of all goods and services that are produced in an economy in a certain time period, usually during a quarter or one year. In South Africa, Statistics South Africa (StatsSA) is responsible for aggregating the country's official GDP statistics.

The relationship between GDP growth (or economic growth) and stock market returns has been the subject of many past studies in finance. Since stock returns are rooted in the productivity of the underlying real economy, many supply-side models assume that GDP growth translates to corporate profit growth and increased earnings per share (EPS) which in turn, drives stock prices up. Past studies by Fama (1981) and Mukherjee and Naka (1995) show that an increase in GDP raises the level of economic activity (aggregate demand and consumption), consequently increasing corporate earnings and hence has a positive effect on stock returns. Sadeghi (1992) conducted a study on the relationship between unexpected changes in macroeconomic variables (including GDP) and Australian stock returns over the period 1980-1991. With regards to GDP, the results of the study show that Australian stock returns are positively correlated with any surprise news in the growth rate of real GDP. In Australia, a 1 percent unexpected increase in GDP growth rate increases the value of shares by 1.77 percent. Similarly, Nasseh and Strauss (2000) found a significant positive relationship between stock prices and domestic economic activity in France, Germany, Italy, the Netherlands, Switzerland and the UK. For instance, a 1 percent increase in real industrial production (a proxy for GDP) increases stock prices by 3 percent in Italy. A later study by Humpe and Macmillan (2009) found similar evidence in the US and Japan. They reported that US and Japanese stock prices are positively related to industrial production (a proxy for GDP). These findings are consistent with widely hypothesised economic theory that a positive relationship exists between GDP and stock prices.

However contrary to popular supply-side models, findings by Fama (1981), Sadeghi (1992), and Mukherjee and Naka (1995), Dimson et al. (2002) and Ritter (2005) found that there is a negative correlation between long-run economic growth and long-run stock market returns across many countries. The study by Dimson et al. (2002) studied the UK, US, Canada, Belgium, Denmark, France, Germany, Ireland, Italy, The Netherlands, Spain, Sweden, Switzerland, Australia, Japan and South Africa. Dimson et al. (2002) showed that corporate earnings lag behind GDP growth in many countries, reflecting a mismatch between long-term real earnings growth and long-term GDP growth.

The mismatch between GDP growth and stock returns can be explained by four factors. Firstly, local markets have increasingly become more integrated with international markets, resulting in economic globalisation. Therefore, global slow growth may adversely impact local stock returns resulting in the mismatch. Secondly, according to Bernstein and Arnott (2003), the creation of new enterprises is a key driver of GDP growth. Creation of new enterprises contributes to the growth in aggregate earnings of an economy and do not necessarily contribute to the high growth of earnings per share to which current investors have a claim. There is a discrepancy between these two growth rates since there are factors that can dilute aggregate earnings. According to Bernstein and Arnott (2003), a portion of GDP growth comes from capital increases (i.e. new share issuances, IPOs or rights issues) which increase the aggregate earnings of an economy, but are not accessible to current investors. In reality, investors do not automatically participate in the profits of newly formed companies. Investors have to dilute their holdings in the “old” economy or invest additional capital when buying shares of new companies. This dilution causes the growth in EPS available to current investors to be lower than growth in aggregate earnings. Bernstein and Arnott (2003) reported that this discrepancy results in a 2 percent dilution of GDP growth before it reaches shareholders. They found that growth in stock prices and dividends was 2 percent less than the underlying macroeconomic growth. Thirdly, in efficient markets, Siegel (1998) argues that the expected economic growth may already be factored into the stock prices, resulting in reduced future realised returns which are reflected in the negative correlation between GDP growth and stock returns. Lastly, Li and Hu (1998) suggest that a surprising pick-up in industrial production (a proxy for GDP) after a long period of expansion when the

economy is already running near full capacity could be interpreted by market participants as indicating an overheating economy. Therefore, market participants fearing that policy makers will soon hike interest rates, may offload stocks from their investment portfolios. This means that higher-than-expected industrial production growth (or GDP growth) figures might well cause the stock market to fall, reflecting an inverse relationship between GDP and stock returns.

There are a few empirical studies focusing on emerging markets in prior literature. Previous studies exploring Eastern European emerging markets by Kwon et al. (1999), Bilson et al. (2001), Hanousek and Filler (2000) and Samitas and Kenourgios (2007) used the industrial production index as a proxy for GDP and found that it is positively correlated to stock returns at the 5 percent significance level across many countries. The industrial production index was found to have a positive impact on stock returns in the Czech Republic and Lithuania, whereas for Poland and Hungary, it has a negative effect on stock returns. Singh et al (2011) analysed the relationship between various macroeconomic variables and the Taiwan stock index, namely the Taiwan 50 Index. In terms of GDP, they found a positive relationship exists between GDP and the stock returns of companies listed on the Taiwan stock index.

In recent times, there has been an emergence of studies examining the relationship between GDP and stock returns in South Africa. Jefferis and Okeahalam (2000) studied the relationship between stock prices and a few selected economic variables which included GDP. The study included South Africa, Zimbabwe and Botswana. In the case of South Africa, they showed that the stock market is positively affected by real GDP. Findings in a study by Hsing (2011) were consistent with Jefferis and Okeahalam (2000). Hsing (2011) studied the effects of selected macroeconomic variables on the JSE in South Africa. Amongst many other findings, he found that the South African stock market index (JSE) is positively influenced by the growth rate of real GDP. Gupta and Reid (2013) analysed the immediate and dynamic impact of macroeconomic shocks on JSE stock returns. The sample period considered in the study was from 2002 to 2011. In relation to GDP, they found that GDP surprises cause stock returns to stay positive post the shock, however the effect is insignificant. A study by Coovadia (2014) covering a longer sample

period from 1994 to 2012, showed that the JSE has a significantly positive long-run relationship with GDP. This finding is in line with economic theory that stock prices are positively related to GDP. Most recently, a study by Tripathi and Kumar (2015) analysed whether macroeconomic factors influence aggregate stock returns in BRICS (Brazil, Russia, India, China and South Africa) markets. They find evidence that GDP has a significant impact on stock returns only in Russia and India. In Russia, there is a significantly negative relationship between aggregate stock returns and past values of GDP, whilst in India, they found that the Indian stock returns are positively linked to contemporaneous GDP values. Tripathi and Kumar (2015) attributed the insignificant influence of GDP shocks on stock returns in Brazil and South Africa to the notion that stock returns tend to lead rather than follow GDP. Therefore, South African and Brazilian stock markets have already discounted for GDP and hence, stock prices already reflect future GDP expectations.

The direction of causality between GDP growth and stock returns is often the subject of much debate amongst economists. Some argue that GDP affects the future cash flows of businesses which directly affect the valuation of stocks prices. Therefore, through this transmission GDP leads stock prices. This argument seems intuitive since stock returns are a function of the future cash flow stream, which is highly dependent upon future economic conditions such as GDP growth. Others argue that assuming markets are efficient, an efficient stock market should already contain information on future economic output such as GDP growth and not the other way around.

2.2 The Relationship between Inflation and Stock Returns

Economists define inflation as a sustained continual increase in the general level of prices for goods and services over a period of time (Barro, 1997; Blanchard, 2000), it can be described as a decline in the real value of money or a loss of purchasing power over time.

In South Africa, the official measure of consumer price inflation is the Consumer Price Index (CPI). In February 2000, South Africa formally introduced and adopted the Inflation Targeting Framework whereby the central bank explicitly announces an inflation target range or band in order to achieve an average rate of increase in consumer prices. The

South African Reserve Bank (SARB) is responsible for achieving and maintaining price stability in South Africa. According to the SARB, as from 25 February 2009, the specified inflation target range or band in South Africa is 3 to 6 percent for the year-on-year increase in the headline CPI (CPI for all urban areas) on a continuous basis. Historically, the initial inflation target measure was the CPIX which changed to CPI in February 2009. CPIX was defined as the CPI for metropolitan and other urban areas, excluding the interest cost/rates on mortgage bonds.

There is a strong association between movements in stock prices and changes in the expected rate of inflation. Economic theory asserts that higher-than-expected inflation may lead to the expectation of more restrictive monetary policies (higher nominal interest rates), which will in turn, lead to reduced cash flows and a higher discount rate in the stock valuation model – the end result will be lower stock prices. A positive inflation surprise (higher than expected CPI) is associated with reduced savings and investments, increased input costs and higher cost of capital for firms in an economy (as investors demand more returns to compensate them for the inflation risk). All of these factors put pressure on firms, making them less profitable and negatively impacting stock returns. This negative relationship runs counter to conventional wisdom that stocks hold their real value during inflation, however the inverse relation has been confirmed in past studies by Jaffe and Mandelker (1976), Fama and Schwert (1977), Fama (1981), Saunders and Tress (1981), Gultekin (1983), Solnik (1983) and Chen, Roll and Ross (1986). They find evidence that a significant negative relationship exists between inflation and stock returns.

In support of economic theory, Sadeghi (1992) found that Australian stock returns over the period 1980-1991 are negatively correlated with surprise news about the inflation rate. Similarly, the results of a study conducted by Graham (1996) reported that US real stock returns are negatively and significantly correlated with the inflation rate. The negative relation arises only in periods when monetary policy is either neutral or counter-cyclical. Li and Hu (1998) examined the responsiveness of US indices to macroeconomic announcements. The study considered the following indices: Dow Jones Industrial Index, the S&P 500 index, the Russell 1000 index, and the Russell 2000 index. Inflation shocks

were found to be significant, announcements about unexpectedly higher inflation depresses stock prices. Similar findings were reported by Flannery and Protopapadakis (2002). They showed that US stock market returns for the period 1980–1996 are significantly negatively correlated with CPI. The results indicated that higher-than-anticipated inflation depresses stock values, this is consistent with previous studies. Rapach et al. (2005) examined the predictability of stock returns using macroeconomic variables (including inflation) in 12 industrialised countries. They found that inflation has significant in-sample and out-of-sample predictive ability at multiple horizons in the Netherlands, Norway and the US. As reflected above, many past studies found that higher-than-expected inflation depresses stock prices. This inverse relationship is consistent with economic theory which asserts that any positive inflation surprise (bad economic news) that raises investors' expectations for future inflation also raises the expectations for future interest rates hikes. An increase in future nominal interest rates will affect the stock market in a negative way since investors will discount corporate earnings or future cash flows using higher nominal interest rates which depress stock valuations.

With regards to the effect of inflation on an emerging stock market, Adrangi, Chatrath, and Raffiee (1999) found that both unexpected inflation and expected inflation had a negative relationship with stock returns in Korea. Fifield et al. (2002) investigated the extent to which inflation (CPI) explains returns in 13 emerging stock markets, namely Chile, Greece, Hong Kong, India, Korea, Malaysia, Mexico, the Philippines, Portugal, South Africa, Singapore, Thailand and Turkey. Stock returns had high correlations with inflation in all the 13 emerging markets. A positive relationship was reported in Greece, Hong Kong, India, Korea, Malaysia, Mexico, the Philippines, Portugal, South Africa, Thailand and Turkey, and a negative relationship in the case of Chile and Singapore (Fifield et al., 2002). A study by Gupta and Reid (2013) found that CPI surprise has a significant effect on stock returns in South Africa, both at the aggregate and sectoral levels. The results of the study show that CPI surprise significantly reduces stock returns in the second month following the shock. The stock returns stay negative throughout the 12-month horizon reflected in the impulse response function of the Bayesian VAR analysis. Tripathi and Kumar (2015) examined the relationship between various

macroeconomic variables (including inflation) and aggregate stock returns in BRICS markets. In South Africa, they found that JSE stock returns have a significant negative relationship with current inflation and long run inflation.

2.3 The Relationship between the Current Account and Stock Returns

The current account is a sub-account of a country's balance of payments. According to the SARB (2016), the current account consists of the balance of trade (goods and services exports less imports), net income from abroad (earnings on foreign investments minus payments made to foreign investors) and net current transfers (unilateral transfers include charitable donations, aids, grants, gifts). A positive current account balance is called a current account surplus. It is generated by positive net sales abroad (i.e. the value of exports is greater than the value of imports) indicating that the country is a net lender to the rest of the world. A negative current account balance is called a current account deficit. It is a resultant of negative net sales abroad (i.e. the value of exports is less than the value of imports) indicating that the country is a net borrower from the rest of the world.

In South Africa, the current account balance is reported by the SARB. In its balance of payments with other countries, South Africa has a persistent current account deficit. In the fourth quarter of 2015, the deficit was reportedly 5.1 percent of GDP (SARB, 2016). The current account deficit leaves South Africa vulnerable to short term capital outflows in the event that investors' risk perceptions and appetite are adversely influenced. The gap in South Africa's current account is heavily financed by a surplus on its financial account, which relies on investment inflows from abroad. Strauss (2015) found that a large part of these investment inflows consists of portfolio investments, such as foreign purchases of domestic stocks and bonds, which are short-term in nature, very volatile and can be easily reversed or taken out by jittery investors.

Economic theory suggests that news about the current account deficit impacts the stock market through expected changes in interest rates and inflation expectations. Sadeghi (1992) found that a lower-than-expected current account deficit strengthens the

Australian dollar in foreign exchange markets, eases the pressure on domestic interest rates, means cheaper imported commodities and lower inflation rates. So, an improvement in the current account deficit is perceived to have a positive influence on stock prices. In contrast, a surprisingly higher-than-expected current account deficit is perceived to have a negative influence on stock prices. This is because a worsening current account deficit leads to a depreciating currency causing a decline in stock prices because of higher inflation expectations (Ajayi & Mougoue, 1996) and higher interest rates.

Aggarwal and Schirm (1992) asserted that the announcement of the balance of trade may reflect useful new information about the supply and demand for domestic currency in foreign exchange markets and the performance of the domestic economy in a global context. They contended that the trade balance and the current account affect international net asset positions. Therefore, consistent with rational expectations, changes in such balances can be expected to influence the prices of various assets, including stock prices. Flow-oriented models of exchange rates focus on the current account or the trade balance and the models state that the currency movement will affect the international competitiveness and the balance of trade position, which in turn, affects the country's real income/output and therefore stock prices (Dornbusch & Fisher, 1980).

Many past studies have found that a surprise in the current account (or balance of trade) influences aggregate stock market indices. Little empirical work looks at the effect that announcements on the current account (or trade deficit) have at the individual firm level. Hardouvelis (1987) and Kretzmer (1991) studied the trade deficit announcement effect on stock markets. Hardouvelis (1987) found that the S&P 500 did not respond to trade deficit news during 1979-1984. However, Kretzmer (1991) found a significantly negative effect in the second half of the 1980s. Interestingly, Aggarwal and Schirm (1992) reported similar findings when they examined the effect of trade news on currencies, interest rates, and U.S. market indices. The results from the study showed that news in the balance of trade announcements significantly influences asset prices. The study found that such stock sensitivity to trade balance announcements has increased significantly in recent years. Trade deficit announcements did not significantly affect financial markets in the

early 1980s. From 1985 through to 1988, the announcement of a surprisingly large trade deficit was associated with negative US stock market returns, a significant depreciation of the US dollar relative to major currencies with the exception of the Canadian dollar, and an increase in US interest rates.

A study by Sadeghi (1992) documented that Australian stock returns are positively correlated with news about surprise improvements in the current account deficit. Results indicate that a 1 percent improvement in the current account deficit increases the stock prices by between 0.03 and 0.05 percent. This shows that a surprisingly declining current account deficit has a positive influence on stock returns since an improvement in the current account deficit is seen as good news by investors. Puffer (1995) found empirical evidence that unexpected bilateral trade balances and revisions of previous overall balances which are released at the same time as the overall trade deficit significantly influence the Canadian dollar and some US stock market indices. Li and Hu (1998) reported that positive trade balance shocks increase stock returns in all the four US stock indices, namely the Dow Jones Industrial Index, the S&P 500 index, the Russell 1000 index, and the Russell 2000 index. Sun and Tong (2000) examined how U.S. and Japanese automobile stocks respond to US trade deficit announcements. The results of the study show that trade deficit news has a statistically significant effect on prices of Japanese stocks traded on U.S. exchanges, the American Depositary Receipts (ADRs). Specifically, a larger-than-expected trade deficit has a negative effect on ADR prices. This finding is consistent with the policy signaling hypothesis of macroeconomic news. In contrast, U.S. automobile stocks do not have a significant response to trade deficit news in general.

Existing literature examining the relationship between the current account (trade balance) and stock returns in emerging markets remains thin. However, in South Africa impulse response results from the Bayesian VAR analysis conducted by Gupta and Reid (2013) showed that after the current account surprise (I.e. lower-than-expected current account deficit) JSE stock returns peak in the second month and the effect stays positive till month six. This finding is in line with economic theory that a current account surprise is perceived

to be good news by the stock market. However, the impact of the current account surprise on JSE stock returns is not significant.

2.4 The Relationship between Interest Rates and Stock Returns

The interest rate is an important monetary policy instrument in many markets across the world. The Repo is the official repurchase rate in South Africa and plays a key role in monetary policy implementation. The repurchase (repo) rate is the base or benchmark rate set by the Monetary Policy Committee (MPC) of the SARB in order to manage inflation. The MPC holds meetings six times a year to analyse pertinent economic information and determine whether the repo rate should increase, decrease or remain the same (SARB, 2016). When the repo rate is changed, the interest rates on loans extended by banks also tend to change. This ripple effect occurs because the repo rate is the rate at which the SARB provides assistance to the banking sector (i.e. the repo represents a cost of credit to the banking sector).

The most direct and immediate effects of monetary policy actions are on the financial markets, short-term interest rate changes affect asset prices and stock returns (Bernanke and Kuttner, 2005). The present value formula of asset prices shows that stock prices are inversely related to interest rates. Therefore, theory assumes that there is an inverse relationship between interest rates and stock prices. Contractionary monetary policy (I.e. increase in interest rates) should induce a pullback in stock prices and returns. This hypothesis is in line with some popular asset price channels of the monetary policy transmission mechanism, most notably Tobin's Q-theory and Modigliani's wealth effect model (Tobin, 1969; Modigliani, 1971). More specifically, higher interest rates are expected to result in declining stock prices as households' balance sheets contract and this has a negative impact on household consumption spending (through the wealth effect on consumption). Higher interest rates have a negative effect on business investment spending (through Tobin's Q effect on investment) since higher interest rates lower the present value of future earning flows for businesses.

Many past studies are dedicated to examining the relationship between interest rates and stock returns in developed markets. Results from past studies are consistent with

economic theory. Pearce and Roley (1984) found that the US Federal Reserve discount rate along with other macroeconomic variables have a significant impact on stock prices. Monetary surprises were found to depress stock prices. Research by Ehrmann and Fratzscher (2004) and Bernanke and Kuttner (2005) showed that US stock markets respond to changes in monetary policy. On average, they found that a hypothetical unanticipated 25-basis-point cut in the US Fed funds rate target leads to about a 1 percent increase in broad stock indices. Rangvid et al. (2005) researched the predictability of twelve developed economies' stock market returns using macroeconomic variables. The 12 developed economies studied were Belgium, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Norway, Sweden, US and UK. The study used macroeconomic variables such as industrial production, money supply, CPI, PPI, exchange rates and interest rates and notably found that interest rates are the reliable and consistent predictors of stock returns in developed economies. Bohl et al. (2008) and Kholodilin et al. (2009) assessed the effect of the European Central Bank's monetary policy actions on European stock returns and found a negative, statistically significant relationship exists. A study by Chatziantoniou et al. (2013) examined how stock markets in Germany, UK and the US respond to monetary and fiscal policy changes. With regards to monetary policy shocks, a positive interest rate change causes a decline in the UK stock market. In Germany, money supply impacts on the stock market directly and not via the interest rate channel (although interest rates are affected by money supply changes). This is a consequence of Germany not having its own independent monetary policy authority that can implement interest rate changes that reflect the specific needs of Germany as a standalone country. With regards to the US, a money supply shock negatively impacts interest rates and consequently, has a negative impact on the US stock market.

Alam and Uddin (2009) conducted a comprehensive study researching the relationship between stock prices and interest rates for 15 developed and developing countries. The study covered the sample period from January 1988 to March 2003. Alam and Uddin (2009) examined the following countries: Australia, Bangladesh, Canada, Chile, Colombia, Germany, Italy, Jamaica, Japan, Malaysia, Mexico, Philippine, South Africa, Spain, and Venezuela. The results of the study found that the interest rates have a significant negative relationship with aggregate stock prices for all the countries.

There is growing interest in the impact of interest rate changes on stock returns in emerging markets, mainly due to the important role these markets play in global portfolio management. Past studies show that interest rates exert much influence on the stock prices of emerging stock markets. Muradoglu et al. (2000) studied the causal relationship between macroeconomic variables and stock returns in 19 emerging markets countries. Results from the study show that interest rates in Argentina, Brazil, Pakistan and Zimbabwe granger cause stock returns. Therefore, changes in interest rates have a significant impact on stock returns in these countries. Fifield et al. (2002) presented similar findings when investigating the extent to which interest rates explain returns in emerging stock markets. They studied the stock market indices of Chile, Greece, Hong Kong, India, Korea, Malaysia, Mexico, the Philippines, Portugal, South Africa, Singapore, Thailand and Turkey. The results of the study show that interest rates are a key indicator and significantly influence the financial sector in the stock markets of all the countries except for India. Gunasekarage et al. (2004) examined the influence of macroeconomic variables on stock market values in Sri Lanka. The treasury bill rate (as a measure of interest rates) was found to exert the strongest influence on stock price changes compared to other variables. A study by Adam and Tweneboah (2008) also found that the interest rate is a key determinant of stock price movements in Ghana.

The nexus between interest rates and stock returns has been the subject of recent studies focusing on South Africa. Mangani (2005) documented that monetary policy has explanatory power for JSE returns. In a later study, Mangani (2009) investigated how changes in the discount rate affect individual stocks on the JSE. The study found that the discount rate has a significant impact on individual stock returns in South Africa. In line with economic theory, Mangani (2009) found an inverse relationship between interest rates and stock prices in South Africa. Van Rensburg (2000) and Mangani (2011) reported similar evidence that an inverse relationship between interest rates and stock prices prevailed on the JSE. Similarly, Gupta and Reid (2013) found that the interest rate shock has a significant impact on South African aggregate stock returns. They found that the monetary policy shock (unexpected change to the repo rate) causes stock returns to move negatively throughout the 12-month period observed on the impulse response function of the Bayesian VAR analysis. Gupta and Reid (2013) showed that monetary

surprise is the only variable that consistently has a significantly negative effect on stock returns, both at the aggregate and sectoral levels. This implies that if monetary surprise has a significant effect on aggregate stock returns in South Africa, investors should take into account the probability of monetary surprise shocks when making investment decisions.

2.5 The Relationship between Changes to the US Federal Reserve Rate and Stock Returns

The US Federal Reserve System (USFed) is the central bank of the United States of America. The US monetary policy is set by the Federal Open Market Committee (FOMC). The FOMC is given a mandate by US Congress to promote maximum employment, stable prices and moderate long-term interest rates in the US economy. In the US, the effective federal funds rate is a key monetary policy tool used by the FOMC. The federal funds rate is the short-term money market interest rate at which depository institutions (banks, credit unions, savings institutions (thrifts), and government-sponsored enterprises) borrow from and lend to each other overnight, on an uncollateralised basis, to meet short-term business needs (US Federal Reserve System, 2016). The target for the federal funds rate is set by the Federal Open Market Committee. Over recent years, the federal funds rate has varied widely in response to prevailing economic conditions during and after the financial crisis that began in 2008.

Changes in the FOMC's target for the federal funds rate affect short-term and long-term interest paid by borrowers and earned by savers in the US (US Federal Reserve System, 2016). With increasing global financial integration, FOMC's rate changes lead to spillovers into global markets (Bredin et al., 2005). Therefore, international investors pay close attention to the release of FOMC's rate decisions as rate changes will most likely affect their global investment portfolios. If US monetary policy causes interest rates to fall in the United States, yields on US dollar assets will look less favorable to international investors. With US dollar assets less attractive, international investors may invest less in dollar-denominated assets and more in foreign currency-denominated assets.

Due to the considerable leadership role played by the US in global markets, any new information on the US Fed's interest rate policies has both direct and indirect influences on other countries' stock markets around the world (Kim & Nguyen, 2009). For example, the quantitative easing policies of the US Federal Reserve implemented in the year following the 2008 financial crisis led to unprecedentedly low US interest rates resulting in large short-term capital inflows to numerous emerging markets (Aizenman et al., 2014). The US dollar became the funding currency in large-scale carry trade activities with emerging markets as the target currencies. The increased capital inflows into emerging markets caused a rise in a number of emerging market stock indices (Aizenman et al., 2014). Later on, US Federal Reserve tapering news had large effects on emerging markets, resulting in substantial drops in stock market indices and large exchange rate depreciations (Bowman et al., 2015). This asserts the popular notion that when the US sneezes, the rest of the world catches a cold.

Conover et al. (1999) analysed whether foreign stock returns are associated with changes in the US monetary policy environment. The study examined 15 foreign countries, namely Austria, Belgium, Canada, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, New Zealand, South Africa, Sweden, Switzerland, and the United Kingdom. Results show that foreign stock returns are related to the US monetary environment, only two of the 15 foreign countries exhibit no significant pattern in stock returns related to the US monetary policy environment. Many foreign markets reflect significantly higher returns when the US Fed is following an expansive period (i.e. a decrease in the US discount rate) versus a restrictive policy. Interestingly, the study emphasises the importance of US monetary policy changes to foreign stock markets by showing that several of the foreign stock markets are more strongly related to the US monetary environment than to their local monetary conditions (Conover et al., 1999).

A study by Bredin et al. (2005) examined the influence of US monetary policy announcements on the Irish stock market. The results of the study show that Irish stock return volatility does appear to be influenced by US monetary policy announcements and the response is asymmetrical. A negative policy surprise (i.e. lower than expected policy rate change) reduces stock market volatility by significantly more than a positive surprise.

Bredin et al. (2005) found that there is a decline in volatility on the day before an FOMC meeting and a subsequent increase in volatility after the results of the FOMC meeting are announced.

Kim and Nguyen (2009) studied the spillover effects of US Fed rate news on 12 stock markets in the Asia-Pacific over the period 1999–2006. The study included these 12 countries: Australia, China, Hong Kong, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore, Taiwan and Thailand. They found that in general, the majority of Asia-Pacific stock indices show negative returns in response to unexpected US Fed rate hikes. Eight out of 12 stock markets show significantly negative responses to the news about an unexpected hike in the Fed's target rate. Kim and Nguyen (2009) suggest that this may be due to the impact of the Fed's unexpected hike on the financing costs for foreign borrowers, and/or the expected reduction in US demand for imports.

A study by Hausman and Wongswan (2011) analysed the impact of FOMC rate announcements on global asset prices, including foreign stock indices. The sample period included 94 FOMC announcements from February 1994 – March 2005. The stock market response varies from country to country. The study found that stock markets in more closed economies such as Malaysia, India, China, Peru and Venezuela do not respond significantly or show a weak response to US monetary policy surprises. In contrast, stock markets in Russia, Hong Kong, Korea, Finland and Turkey respond statistically significantly to FOMC rate announcements at the 95 percent confidence level. Korea and Finland have a high concentration of information technology and telecommunication services sectors in their stock markets, and generally, these sectors tend to be more sensitive to FOMC rate surprises (Ehrmann and Fratzscher, 2004; Bernanke and Kuttner, 2005), which explains the strong response in Korea and Finland. According to Hausman and Wongswan (2011), Hong Kong's stock market is highly responsive since its economy is heavily dependent on external sectors that are linked to the US. Hausman and Wongswan (2011) further found that most of the variation in Canadian and South African stock markets can be attributed to FOMC rate surprises.

With regards to emerging markets, a study by Chen et al. (2014) found that US monetary policy shocks do affect capital inflows and asset price movements in emerging market economies. The study included 21 emerging market economies, namely Brazil, Chile, China, Colombia, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Peru, Philippines, Poland, Romania, Russia, Singapore, South Africa, Taiwan, Thailand, and Turkey. Countries with stronger fundamentals (higher real GDP growth, stronger external current account positions, lower inflation and lower shares of local debt held by foreigners) were perceived as less risky and thus least affected by US monetary policy shocks.

2.6 The Relationship between the Oil Price and Stock Returns

Crude oil is traded globally. It is one of the most actively traded commodities in the world (US Energy Information Administration, 2016) and its price is the most volatile in the commodity market (Regnier, 2007). There are three primary global oil price benchmarks that serve as a reference price for buyers and sellers of crude oil, namely West Texas Intermediate (WTI), Brent Crude Blend and Dubai Crude. According to the US Energy Information Administration (2016), variations in quality of the oil and location result in price differentials, but because oil markets are integrated globally, prices tend to move closely together over a long-term period. Crude oil prices are the primary driver of petroleum product prices - these include petrol, diesel fuel, heating oil waxes, jet fuel and lubricating oils (US Energy Information Administration, 2016). These petroleum products are consumed in important transportation applications and serve as key inputs for most businesses in an economy.

Both crude oil and petroleum product prices can be affected by events that have the potential to disrupt the flow of oil and products to market. The US Energy Information Administration (2016) reports that in the past, major oil shocks have resulted from geopolitical events and weather-related developments such as hurricanes shutting down oil production and key refineries. These events led to actual disruptions to supply or created uncertainty about future supply or demand, resulting in high oil price volatility.

Events that disrupt supply or increase uncertainty about future oil supplies tend to drive up oil prices (US Energy Information Administration, 2016).

In terms of the correlation between oil shocks and stock market returns, an increase in oil prices will raise input costs for most businesses (US Energy Information Administration, 2016). Theorists and market commentators would predict that higher input costs would increase the costs of production and put pressure on business profits, this would negatively impact businesses resulting in reduced corporate earnings and declining stock prices. Higher fuel prices also increase consumer concerns about inflation resulting in consumers cutting down on discretionary spending which can put a drag on business earnings and stock returns. It therefore seems logical to simply assume a negative correlation exists between oil prices and stock market returns; however past empirical studies reflect many conflicting results with regard to the relationship between oil price shocks and stock market returns.

According to Bjørnland (2009), the conflicting results can partly be explained by the existence of a positive relationship linking up an increase of the oil price with a booming economy in oil-exporting countries (since a rising oil price means an increase in the expected future cash flows for firms within the country). In contrast, a negative relationship exists between oil prices and stock returns of oil-importing countries because an increase in oil prices has higher inflationary effects (increased costs of production and import inflation) forcing governments of oil-importing countries to raise interest rates in order to curb against inflation. Higher interest rates have a negative impact on the intrinsic value of stock prices (Huang et al., 1996). This would unfavorably affect stock returns in oil-importing countries.

Gjerde and Saettem (1999) found that oil price increases are beneficial for listed Norwegian companies, since Norway is an oil-exporting country. Oil price shocks result in immediate positive stock price effects. Similarly, a study by Bjørnland (2009) analysed the impact of oil price shocks on Norwegian stock returns. The results of the study showed a positive relationship exists since a 10 percent increase in oil prices led to a 2.5 percent increase in stock returns. A study focusing on how oil price shocks impact the Istanbul Stock Exchange in Turkey showed that oil price changes do not have a significant impact

on real stock returns in Turkey (Sari and Soytas, 2006). These findings were very peculiar, since Turkey is a net energy importer and oil accounted for about 40 percent of its primary energy consumption in 2002 (State Planning Organization, 2004). According to Sari and Soytas (2006), a possible explanation for this peculiar finding is that the Turkish government imposes a high excise tax on oil and therefore world oil price shocks may be absorbed by the changes in the tax rate, resulting in stock returns not fully reflecting the oil price shocks when they occur. A study conducted by Cunado and Gracia (2014) examined the impact of oil price shocks on the stock returns of 12 oil-importing European countries (Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Spain, Portugal and the UK). As expected in oil-importing economies, oil price changes were found to have a negative and significant impact on stock market returns in most of the countries (Cunado and Gracia, 2014).

In past literature, a number of studies are dedicated to examining the relationship between oil price changes and stock returns in developed countries, especially the US. Results vary across time. Kaul and Seyhun (1990) found a significantly negative relationship exists between real stock returns on the New York Stock Exchange (NYSE) and oil price volatility. Contrastingly, Huang et al. (1996) found no correlation between oil futures returns and various US stock indices, such as the S&P500, during the 1980's. The results from a later study by Sadorsky (1999) show that oil price shocks depress US real stock returns.

Several studies have found a positive relationship between oil price shocks and the stock returns of oil and gas companies (and the oil and gas indices). Huang et al. (1996) found a significant positive relationship between US oil company stock returns and oil futures returns. Faff and Brailsford (1999) analysed the sensitivity of Australian stock returns to an oil price factor. They found a positive and significant impact of oil prices on the oil, gas and diversified resources industries. Sadorsky (2001) investigated the relationship between oil and gas stock indices and oil price changes in Canada. The results of the study showed a significant and positive relationship exists between oil and gas stock indices and oil price changes in Canada. Similarly, El-Sharif et al. (2005) studied the relationship between crude oil prices and stock values in the oil and gas sector in the UK,

the largest oil producer in the European Union. The study found that oil and gas stock returns are impacted by changes in crude oil prices. A highly significant positive relationship exists between oil price changes and stock values within the oil and gas sector in the UK.

Many past studies have focused on the impact of oil price shocks on the stock returns of developed markets, only recently has the same effect been investigated in developing markets. According to Wakeford (2006), developing countries tend to be more vulnerable to oil price shocks than developed economies, especially where manufacturing and mining are relatively important sectors. Therefore, it is of critical importance that future study efforts are dedicated to examining the impact of oil price shocks on the stock returns of developing and emerging markets. Shammas (2012) studied the impact of oil price shocks on stock returns in emerging markets, particularly focusing on the BRICS (Brazil, Russia, India, China and South Africa) markets. The study found a significant interrelationship exists between the BRICS markets with the notable exception of South Africa. Shammas (2012) documented that oil prices do affect BRICS markets, but to varying degrees. The most responsive countries to oil shocks are Brazil and Russia, a positive relationship was found to exist between oil shocks and stock returns in Brazil and Russia. Russia is the main oil supplier in the global market (Fang and You, 2014), therefore they benefit from higher oil prices. Shammas (2012) found that the Indian and Chinese stock markets respond negatively to oil shocks, this makes sense since India and China are two of the world's biggest energy consumers (Fang and You, 2014) and are net oil importing countries. The South African stock market exhibits a small and slow response to oil shocks (Shammas, 2012).

A past study by Gupta and Modise (2013) showed that South African stock returns react differently to oil price shocks, depending on the underlying causes of the increase in the oil price. Since South Africa is a net oil-importing country, stock returns only increase with oil prices when global economic activity improves due to aggregate demand shocks; whilst oil supply shocks put downward pressure on South African stock returns. Therefore, there is a positive relationship between aggregate demand shocks and stock returns; and a negative relationship between oil supply shocks and stock returns,

particularly because South Africa is a net oil-importing emerging market. Fang and You (2014) studied the impact of oil price shocks on the stock returns of three large emerging markets, namely Russia, India and China. The study produced mixed findings for each country. In Russia, only when the oil price movement is driven by Russian oil-specific supply shocks are there significant positive impacts on Russia's stock returns. As long as the oil price is not driven by the increasing oil consumption of India, oil prices tend to always have a negative impact on India's stock returns. In China, the oil price changes driven by global oil demand shocks have an insignificant effect on the Chinese stock market; this is due to the incomplete nature of China's stock market which only reflects demand from domestic investors. China's oil-specific demand-driven oil price has a significant negative effect during the 3rd to 6th months; this can be directly attributed to the relatively low energy efficiency of China (Fang and You, 2014).

The mixed results from past studies generally indicate that there has been no consensus among economists about the relationship between global oil market shocks and stock market returns.

3 CHAPTER 3: DATA AND RESEARCH METHODOLOGY

The immediate impact of macroeconomic surprises on each individual stock is examined using an event study as previously conducted by Bernanke and Kuttner (2005) and Gupta and Reid (2013). The most dominant impacts on individual stocks are identified in the event study.

The dynamic effects of macroeconomic shocks on individual stock returns are studied using the Bayesian Vector Autoregression (BVAR). An in-depth analysis of impulse response functions obtained from BVAR is undertaken.

In the event study, the log returns for each individual stock have been regressed against the "surprise" components of macroeconomic data releases in the regression model:

$$\textit{Stock Return} = \textit{Constant} + \boldsymbol{\beta_1} Rm_t + \boldsymbol{\beta_2} GDP_t + \boldsymbol{\beta_3} CPI_t + \boldsymbol{\beta_4} CA_t + \boldsymbol{\beta_5} REPO_t + \boldsymbol{\beta_6} USFed_t + \boldsymbol{\beta_7} OIL_t + \boldsymbol{\varepsilon_t} \ldots\ldots \textbf{(1)}$$

The log return of each individual stock is the dependent variable, whilst the surprise components of the various macroeconomic data are the independent variables.

The approach used by Gürkaynak et al. (2005) is adopted which is normalising the macroeconomic surprise variables by dividing each series by its standard error in order to ensure comparability of the surprises and ease of interpretation.

3.1 Macroeconomic Surprises

This study uses macroeconomic surprises as "regressors" since efficient markets are unlikely to respond to policy actions that were already anticipated as this information would already be incorporated into forward-looking stock prices (Bernanke and Kuttner, 2005). It follows that only the unanticipated component of the policy announcement, which constitutes a macroeconomic surprise, moves stock prices. Market efficiency as defined by Fama (1970), states that a market is efficient if asset prices fully reflect the information available. The efficient market hypothesis (EMH) states that investors cannot profit by trading on news reports and other public information, because the stock prices adjust to information as soon as it is known.

If markets are efficient and stock prices are forward-looking, we expect stock prices to materially adjust in response to unanticipated macroeconomic news announcements. Therefore, the macroeconomic surprise variables are created in order to capture the "surprise" experienced by individual stocks following the release of unanticipated macroeconomic news. It is important to isolate the unanticipated macroeconomic surprises (new information) from anticipated macroeconomic data releases.

Gupta and Reid (2013) defined the surprise variable as the difference between the actual data release and the median forecast from a survey of a panel of professional forecasters, polled shortly before that data release by Bloomberg in the week leading up to the macroeconomic data releases:

Surprise = Actual release – Median forecast ……..…….... **(2)**

For this study, the definition of the surprise variable is similar to that provided by Gupta and Reid (2013). However, a more robust definition is derived in an effort to further isolate the macroeconomic shocks and account for the degree of uncertainty of the forecasts or deviations from professional forecasters' expectations. This study introduces a stricter criterion for determining what constitutes a "surprise" by incorporating a measure of volatility, the standard deviation, into the surprise definition to account for the uncertainty of the forecasts. In this study, the actual release data must be at least two standard deviations from the mean forecast to constitute a "surprise". It follows that the surprise variable is redefined as:

Surprise = Actual release – Median forecast, provided actual release data is at least 2 standard deviations from the mean forecast …… **(3)**

Each surprise variable is made up of a number of dates on which macroeconomic data is released about that particular variable and for which a "surprise" (as defined above) is identified.

3.2 Endogeneity Effect

The endogeneity problem arises from the feedback or simultaneous interaction between the stock market and the macroeconomic policy decisions (Farka, 2009), which is the

possibility that macroeconomic policy decisions are affected by recent stock price movements.

In order to reduce the endogeneity effect in this study, the “surprise” component of macroeconomic variables is used together with a short event window of one week leading up to the macroeconomic data releases. The use of a narrow window period reduces the chances that more than one macro shock is experienced in the window period. Similar to Gupta and Reid (2013), this event study uses daily data in order to isolate the impact of the surprise experienced by the market on the day of a macroeconomic data release or monetary policy announcement. In order to run the regressions, the daily event study data is then extrapolated to monthly series. Some past studies have used high frequency intraday data instead of using daily data surrounding the macroeconomic data announcements to limit the impact of endogeneity on the regression results. Whilst applying the intraday approach, Gürkaynak, Sack, and Swanson (2004) found a stock price response that was virtually identical to that obtained from daily data. D’Amico and Farka (2003) reported a similar reaction using an approach incorporating intraday data. Since both studies report results that show similar reactions by stock prices to daily data and intraday data, this study uses daily data as per Gupta and Reid (2013). The use of the surprise component, the relatively short event window and the use of daily data to isolate the surprises in the event study allows us to discern more clearly the individual stocks’ reaction to macroeconomic surprises.

3.3 Event Study

Similar to the study by Gupta and Reid (2013), the regressors in the event study are *Gross Domestic Product (GDP)* growth to model unexpected changes to economic growth or output shocks, *Consumer Price Index (CPIX which changed to CPI in February 2009)* to model unexpected changes to consumer inflation expectations, *Current Account (CA)* to model unexpected changes to the country’s balance of payments and the *Official Repurchase Rate (REPO)* to model unexpected changes to the monetary policy tool. The monetary policy surprise is constructed using market data (and not survey data) which is available at a higher frequency. As per Gupta and Reid (2013), the change in the three-

month banker's acceptance (BA) rate on the day after the Monetary Policy Committee (MPC) announces the official repurchase rate decision, is used to model the monetary policy surprise. The MPC announcement is made at 3pm whereas the BA is set by the banks at midday, therefore any changes to the BA rate in response to the MPC announcement will be captured on the day following the announcement. This sequencing of events and attention to timing ensures that the surprise can be accurately matched to the movement in the dependent variable.

This research report introduces three additional regressors to the event study, namely:

1) *Market Return (Rm)* to control for or take away the effect of the market index on the individual stock returns. The market adjustment is conducted by using the FTSE/JSE Top 40 Index as a proxy for the market. The index is used to capture the wider market effects, as majority of past studies conjecture that most of the economic effects are captured at equilibrium by the total market index.

2) *U.S. Federal Reserve (USFed)* to model the impact of Fed rate surprises on individual stock returns in South Africa. South Africa has increasingly become more integrated with international capital markets since the process of capital control liberalisation took place from the mid-1990s. With increased financial integration and financial liberalisation, US interest rates have a significant effect on South African financial markets. According to Mackowiak (2007), US monetary policy shocks affect interest rates and the exchange rates in emerging markets. The interest rate differential between the US and South Africa has a direct influence on the level of foreign portfolio flows into and from South Africa via the dollar-rand carry trade. Foreign investors chasing higher yields and seeking to profit from the rate differential between the US and South Africa via the dollar-rand carry trade have become active participants in the South African stock market. In a dollar-rand carry trade, a trader buys a high-yielding currency such as the South African Rand (ZAR), and sells a low yielding counterpart such as the US Dollar (US$). The trader expects the ZAR to strengthen against the US$ over time but they also collect the interest-rate differential between the two currencies.

Foreign portfolio flows tend to be volatile and sensitive to changing conditions in global capital markets (Alleyne and Mecagni, 2014). The inclusion of the *USFed* as an additional regressor in this study is relevant to the South African context, since South Africa has relatively liquid markets making it easy for foreign investors to adjust their asset holdings when faced with changing global market conditions. Foreign investors tend to sell off South African bonds and stocks when there is a significant decline in domestic interest rates relative to US interest rates. The US Fed surprises that cause a sudden unwinding of the dollar-rand carry trade lead to a reversal of foreign capital flows and consequently, depress South African asset prices. Therefore, it is important to study the impact of Fed surprises on individual stocks in South Africa.

In order to compute the surprise component of the US monetary policy shocks, the difference between the actual and median forecast of the Federal funds rate is used. The federal funds rate is the short-term interest rate targeted by the Federal Reserve's Federal Open Market Committee (FOMC) as part of its monetary policy. As implemented with previous regressors, we calculate the difference between the actual data release of the federal funds target rate (upper bound) and the median forecast from a survey of a panel of professional forecasters, polled shortly before the actual data release by Bloomberg in the week leading up to the macroeconomic data releases. The strict criterion is again adopted incorporating the standard deviation as a volatility measure:

Surprise = Actual release – Median forecast, provided actual release data is at least 2 standard deviations from the mean forecast …… **(3)**

3) *Oil Price (OIL*) to model the impact of unexpected changes to the Brent crude spot oil price (US$ per barrel) on individual stock returns in South Africa. Oil price shocks are very large and sharp increases or decreases in the nominal crude oil prices as captured by the Oil price variation. The oil price variation has been used extensively in past empirical literature on oil shocks and macroeconomic variables (Hamilton, 1983; 1996).

The oil price variation is the first log difference of daily nominal oil prices where OIL_t is the log level of the nominal oil price at time t, and OIL_{t-1} is the log level of the nominal oil price at time t-1. The oil price variation will constitute an Oil Price shock only if ΔOIL_t is greater than +5% or less than -5%. In the interests of robustness, we introduce a stricter criterion for determining what constitutes an oil price "surprise" by including a daily oil price volatility measure to identify the oil price shock and account for variability in the oil price during the event window. It follows that the surprise variable is defined as follows:

$\Delta OIL_t = OIL_t - OIL_{t-1}$, *provided* ΔOIL_t *is greater than +5% or less than -5% and the actual daily volatility is at least 2 standard deviations from the mean daily volatility measure* …… **(4)**

The inclusion of *OIL* as a proxy for commodity price shocks is pertinent to the JSE Top 40 Index since it is largely dominated by commodity stocks and South Africa is an oil-importing emerging economy.

Energy counts for up to 50% of the production cost of many commodities; a rise in the oil price increases the cost of production for many other commodities which ultimately increase commodity prices (US Energy Information Administration, 2016). Since there is a strong relationship between oil prices and other commodity prices, this study uses *OIL* as a proxy for commodity shocks.

The sample period for the study is January 2005 to December 2015. This event study only includes JSE Top 40 stocks that were listed for the entire period of the study (January 2005 - December 2015).

The twenty-four individual stocks[1] that were listed on the JSE for the entire study period and are therefore included in the study sample are summarised in Table 1.

The twenty-four stocks included in the study sample cover a wide range of JSE sectors, such as Mining, Oil and Gas Producers, Industrials, Financial Services, Banks, Life

[1] A brief description of all twenty-four companies has been obtained from Bloomberg (2016) and is included in the Appendix for ease of reference

Insurance, Real Estate Investment Trusts (REITs), Mobile Telecommunications, Media, Healthcare Equipment and Services, General Retailers, Food Producers and Beverages.

Table 1: Twenty-four individual stocks included in the study sample

No	Ticker	Company Name
1	AGL	Anglo American PLC
2	AMS	Anglo American Platinum Ltd
3	BGA	Barclays Africa Group Ltd
4	BIL	BHP Billiton PLC
5	BVT	Bidvest Group Ltd/The
6	CFR	Cie Financiere Richemont SA
7	FSR	FirstRand Ltd
8	INL	Investec Ltd
9	INP	Investec PLC
10	ITU	Intu Properties PLC
11	MTN	MTN Group Ltd
12	NED	Nedbank Group Ltd
13	NPN	Naspers Ltd
14	NTC	Netcare Ltd
15	OML	Old Mutual PLC
16	REM	Remgro Ltd
17	RMH	RMB Holdings Ltd
18	SAB	SABMiller PLC
19	SBK	Standard Bank Group Ltd
20	SLM	Sanlam Ltd
21	SNH	Steinhoff International Holdings NV
22	SOL	Sasol Ltd
23	TBS	Tiger Brands Ltd
24	WHL	Woolworths Holdings Ltd/South Africa

Source: Bloomberg (2016)

Twenty-four regressions are run using each individual stock at a time as the dependent variable. Daily closing price data on the individual stocks and data on the FTSE/JSE Top 40 Index was obtained from Bloomberg (2016). The stock price series are converted to log stock return percentages by computing the first differences of logarithmic prices. The actual release and survey data from a panel of professional forecasters for GDP, CPI and the Current Account was obtained from Bloomberg (2016). Data on daily Brent crude oil spot prices was sourced from Bloomberg (2016) and the US Energy Information Administration. Data on the US Federal Reserve was obtained from Bloomberg (2016) and the Trading Economics website (www.tradingeconomics.com/united-states/interest-

rate). The event study was conducted by using specific event study software obtained from www.eventstudymetrics.com in conjunction with E-views.

3.4 Bayesian Vector Autoregressive (BVAR)

The Bayesian Vector Autoregressive analysis provides insight into the dynamic effects of the macroeconomic shocks on each individual stock. The BVAR model is often used to study policy responses. Similar to the study by Gupta and Reid (2013), impulse response functions obtained from a BVAR are used to analyse the dynamic relationships. The BVAR model is preferred over the classical VAR model as it allows us to retain the exogeneity of the macroeconomic shocks through appropriate setting of priors defining the mean and variance of the parameters in the VAR. Our BVAR model includes the returns on each individual stock, the macroeconomic surprises and the return on the market.

Data for the BVAR analysis was obtained from Bloomberg (2016), the South African Reserve Bank's (SARB) official website (www.reservebank.co.za) and the Statistics South Africa website (www.statssa.gov.za). The BVAR analysis is based on monthly data, daily data from the event study is converted to monthly measures by taking averages of the daily data each month. In the event that there are no surprises for a particular month, the value for that specific month is set to zero. E-views is the primary statistical package of use for the BVAR analysis.

The BVAR model is estimated by setting appropriate priors on the mean and variance of the parameter space as follows (Gupta and Reid, 2013):

I. Sims (1980) unrestricted VAR model $y_t = A_0 + A(L)y_t + \varepsilon_t$ is converted to Bayesian VAR by imposing restrictions on coefficients of the VAR whilst assuming that parameters associated with longer lags are more likely to be near zero than the coefficients on shorter lags:
   - coefficient on the first own lag of a variable or prior means corresponding to lagged dependent variables have a mean of unity (lagged dependent variables are important explanatory variables)

- normal prior distributions have zero means and small standard deviations for all coefficients (all these coefficients are less important variables to the model)
- standard deviation for all coefficients decreasing as the lags increase

II. Specify individual prior variances for a large number of coefficients based on only a few hyperparameters as per Doan et al. (1984)

III. BVAR model estimated using Theil's (1971) mixed estimation technique

Our BVAR model is estimated using two lags chosen by the Bayesian or Schwarz information criteria over the study period January 2005 to December 2015.

The BVAR model impulse response functions from the study by Gupta and Reid (2013) showed that in addition to the monetary policy surprise, the CPI surprise also significantly affects aggregate stock returns in South Africa, but mainly at shorter horizons immediately after the shock. These findings only provide insight into the dynamic relationship between macroeconomic surprises and aggregate stock market returns. This research report examines the dynamic effects of the macroeconomic shocks on twenty-four individual stocks listed on the JSE for the entire study period.

4 CHAPTER 4: RESEARCH RESULTS

4.1 Descriptive Statistics

The descriptive statistics presented in Figure 1 were calculated for the monthly return series of the JSE Top 40 Index (JSE Top 40) over the 10-year study period from January 2005 to December 2015. A number of points emerge from the descriptive summary statistics. The average monthly return on the JSE Top 40 is positive at 1.05% while the median is slightly larger at 1.39%. Monthly returns range from -16.14% to 12.10%. Bloomberg (2016) shows that the average monthly return on the S&P 500 is significantly lower at 0.42% over the same sample period. The S&P 500 is a price index that reflects the performance of 500 large cap stocks listed on the NYSE or NASDAQ in the US. The monthly standard deviation for the JSE Top 40 is 4.83%, by contrast, the monthly standard deviation for the S&P 500 is lower at 3.84% for the same sample period (Bloomberg, 2016). Therefore, JSE Top 40 returns are more volatile than the developed market returns of the US. This result is in line with expectations, since stocks from emerging capital markets typically display higher volatility or standard deviation than stocks from developed capital markets (Bekaert and Harvey, 1997).

The third and fourth moments of the series show that the distribution of returns is negatively skewed at -0.40 and leptokurtic since kurtosis is greater than 3. The negative skewness means that there are more extreme negative returns than positive returns. These results indicate that the JSE Top 40 returns do not follow a normal distribution. The Jarque-Bera test confirms a significant departure from normality at the 5% significance level. This is a common occurrence, especially for emerging market stock returns. An analysis of many emerging market returns reflects non-normal distributions as evidenced by skewness and excess kurtosis (Bekaert, G et al., 1998). Our sample is sufficiently large therefore we are less concerned about the violation of the normality assumption.

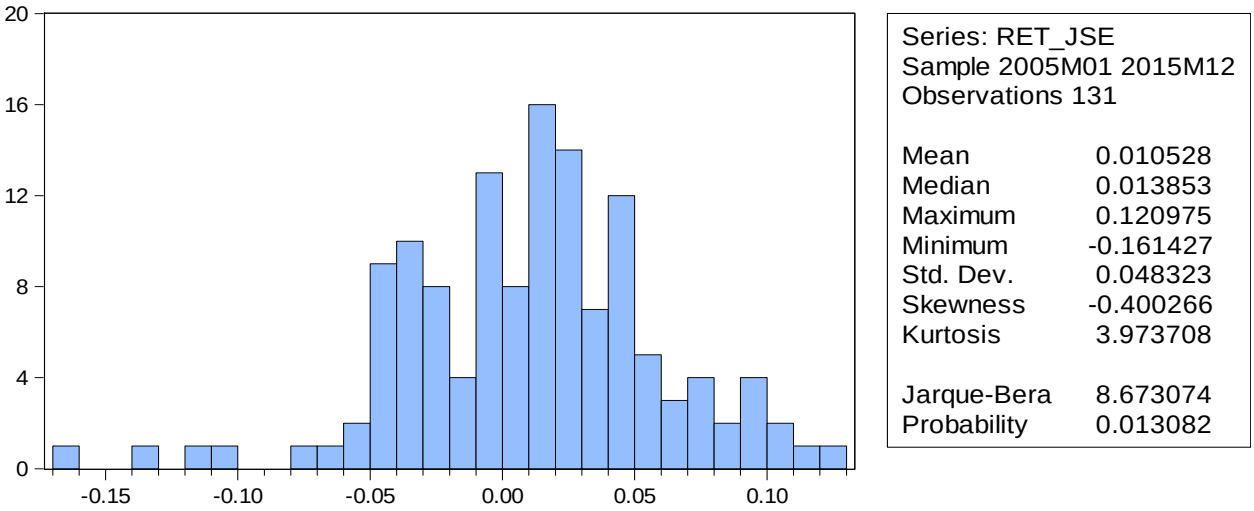

Figure 1: Descriptive statistics for JSE Top 40 Index

The descriptive statistics for the macroeconomic variables, namely GDP growth, CPI, REPO, OIL, CA as a % of GDP and USFed over the 10-year study period are summarized in Table 2.

Table 2: Descriptive statistics for the macroeconomic variables

Descriptive Statistics	CA	CPI	FED	GDP	REPO	LOGOIL
Mean	-4.91	0.01	0.02	0.03	0.07	0.00
Median	-4.95	0.01	0.00	0.03	0.07	0.00
Maximum	-4.12	0.02	0.05	0.05	0.12	0.01
Minimum	-5.44	0.00	0.00	-0.04	0.05	-0.02
Std. Dev.	0.36	0.00	0.02	0.02	0.02	0.00
Skewness	0.26	0.11	0.99	-1.23	1.04	-0.59
Kurtosis	1.88	2.95	2.29	4.26	3.06	4.30
Jarque-Bera	7.60	0.28	24.42	42.00	23.95	16.90
Probability	0.02	0.87	0.00	0.00	0.00	0.00
Observations	120	132	132	132	132	132

As shown in Table 2, the lowest GDP growth figure is -4% which was unsurprisingly experienced during the period of the 2008/2009 global financial crisis when internationally world GDP was negative. The lowest CPI figure was 0.00 reported both in November 2008 and December 2008. In October 2008, the REPO reached a maximum of 12%. Notably, these extreme figures coincided with the devastating 2008/2009 global financial

crisis. The distribution of the oil price variation (OIL) is negatively skewed at -0.59 and leptokurtic with kurtosis at 4.30 displaying fat tails. Typically, oil price changes show significant excess kurtosis, this phenomenon is well documented by Kat and Oomen (2007). In line with expectations, the average CA deficit as a % of GDP is -4.91%. South Africa continues to experience a growing and persistent CA deficit making it dependent on savings from the rest of the world in order to fund the deficit. The average monthly federal funds target rate (upper bound) is positive with an average figure of 2%. In response to the global financial crisis, the US federal funds target rate reached a minimum of 0.00% in March 2009. The low interest rate environment was required to stimulate economic activity.

The correlation matrix in Table 3 shows that there are no strong significant correlations between the explanatory variables. A general rule of thumb is that a correlation greater than 0.8 is regarded as strong, whereas a correlation less than 0.5 is generally described as weak. All the pairwise correlations on Table 3 are less than 0.5 indicating weak collinear relationships between the variables.

Table 3: Correlation matrix for the explanatory variables

Correlation Probability	CA	CPI	GDP	REPO	OIL	USFed	Rm
CA	1.00						
CPI	0.16	1.00					
GDP	0.23	0.02	1.00				
REPO	-0.14	-0.19	0.25	1.00			
OIL	0.05	0.32	0.07	-0.04	1.00		
USFed	0.02	-0.19	0.12	0.21	-0.11	1.00	
Rm	-0.01	0.07	0.02	-0.10	0.48	0.04	1.00

4.2 Diagnostic Tests

Time series data, by its nature, is expected to portray certain non-normality characteristics. This is further reinvigorated by the behavior of the series in the preceding preliminary statistics. What the preceding stage of data analysis has communicated is that the series portrays characteristics of time dependency. As reported, the third and fourth moments indicate that the series are not normally distributed, hence it is important to ascertain to what extent do the series trend together over time. A unit root test was conducted in an attempt to identify non-stationarity or the presence of unit roots, or deterministic trend in the stochastic series generating process. Brooks (2014) describes a stationary series as one with a constant mean, constant variance and constant autocovariances for each given lag. Stationarity can strongly influence the behaviour of a series. For example, 'shocks' to stationary data will gradually die away whereas 'shocks' to non-stationary data persistent infinitely and can lead to spurious regressions (Brooks, 2014).

The standard Augmented Dickey Fuller (ADF) unit root test was used to test for stationarity. We established that all the individual stock return series and macroeconomic surprise series are stationary. The results of the unit root test are presented in Table 3.

The ADF test defined the critical t-value for a model that does not drift or have a deterministic trend as -2.93. If the t-statistic is more negative than -2.93, this indicates that the series is stationary and that the random-walk theory holds.

The ADF test results in Table 4 clearly indicate that all the surprise and individual stock series are stationary since their t-statistics are more negative than the critical value of -2.93 at the 5% significance level.

Table 4: Summary of Unit Root Test Results from ADF Test

Variables	t-Stat
CA	-7.2027523
CPI	-6.6036182
USFed	-5.0930944
GDP	-7.7087145
REPO	-5.2700996
OIL	-8.457119
Rm	-12.45008
Anglo American Platinum Ltd	-6.3520942
Anglo American PLC	-7.6640285
Barclays Africa Group Ltd	-7.3027547
BHP Billiton PLC	-8.6595493
Bidvest Group Ltd/The	-7.2372332
Cie Financiere Richemont SA	-6.4066094
FirstRand Ltd	-5.2202316
Intu Properties PLC	-5.7275521
Investec Ltd	-7.6098504
Investec PLC	-8.7502107
MTN Group Ltd	-5.1842529
Naspers Ltd	-5.9286738
Nedbank Group Ltd	-6.2485772
Netcare Ltd	-5.8352831
Old Mutual PLC	-6.5687102
Remgro Ltd	-6.2072693
RMB Holdings Ltd	-4.6565702
SABMiller PLC	-6.1659683
Sanlam Ltd	-6.4983352
Sasol Ltd	-7.7812777
Standard Bank Group Ltd	-6.6062877
Steinhoff International Holdings	-5.8523405
Tiger Brands Ltd	-6.0552863
Woolworths Holdings Ltd	-6.5460203

Two tests were conducted to investigate whether any relationship exists between the current value of error terms and any of its previous values. Firstly, we conducted the Durbin-Watson test and secondly, the Breusch-Godfrey test to detect autocorrelation.

The Durbin-Watson (DW) test was employed to test for first order autocorrelation in the residuals (I.e. to test whether a relationship exists only between an error and its immediately previous value).

The DW test statistic has the following null and alternative hypotheses:

$H_0 : \rho = 0$ (No evidence of autocorrelation)

$H_1 : \rho \neq 0$ (First order autocorrelation is present)

Under the null hypothesis, the errors at time *t* -1 and *t* are independent of one another (Brooks, 2014). If the null hypothesis is rejected, it would be concluded that there is evidence of a relationship between successive residuals. The DW test sets the statistic interval between 0 and 4. If the test statistic is either equal to or close to two, then there is no evidence of autocorrelation. Therefore, we cannot reject the null hypothesis. If the test statistic is below one or above three, then first order autocorrelation is present. Therefore, we reject the null hypothesis. If the individual stock returns in the study sample follow the random walk theory, then the DW test should have test statistics that are either equal to or close to two (Seddighi et al., 2000).

Our results from the DW test indicate that there is no autocorrelation as all twenty-four regressions have DW statistics that are either two or very close to two.[2] Therefore all the regressions support the null hypothesis of no autocorrelation.

We conducted the Breusch-Godfrey test since it is a more general test for autocorrelation up to the *r*th order (Brooks, 2014). The model for the errors under this test is:

$$u_t = \rho_1 u_{t-1} + \rho_2 u_{t-2} + \rho_3 u_{t-3} + \cdots + \rho_r u_{t-r} + \vartheta_t \,,\ \vartheta_t \sim N(0, \sigma_\vartheta^2) \quad \text{..... (5)}$$

The null and alternative hypotheses are:

$H_0 : \rho_1 = 0 \text{ and } \rho_2 = 0 \text{ and ... and } \rho_r = 0$ (No evidence of autocorrelation)

$H_1 : \rho_1 \neq 0 \text{ and } \rho_2 \neq 0 \text{ and ... and } \rho_r \neq 0$ (Autocorrelation is present)

Under the null hypothesis, Brooks (2014) states that the current error is not related to any of its *r* previous values.

[2] The results of the Durbin-Watson test are included in the Appendix, Table 7

Table 5: Results of the Breusch-Godfrey Serial Correlation LM Test

F-statistic	6.952713	Prob. F(5,100)	0.0000
Obs*R-squared	29.66536	Prob. Chi-Square(5)	0.0000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 02/21/17 Time: 21:25
Sample: 2006M06 2015M12
Included observations: 115
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000197	0.004813	-0.040972	0.9674
DCA	-0.001172	0.008423	-0.139162	0.8896
LAGOIL	-0.031117	0.145818	-0.213393	0.8315
GDPSUP	0.157842	0.113088	1.395741	0.1659
FEDSUP	-0.103636	0.452385	-0.229089	0.8193
REPOSUP	-0.071527	0.503245	-0.142131	0.8873
CPISUP	-0.13231	0.355514	-0.372165	0.7106
RET_JSE	-0.000701	0.010754	-0.065199	0.9481
AR(1)	-0.108344	0.244619	-0.442907	0.6588
AR(2)	0.082692	0.161846	0.51093	0.6105
RESID(-1)	0.286766	0.257795	1.112379	0.2686
RESID(-2)	0.245844	0.253265	0.970696	0.334
RESID(-3)	-0.449248	0.205544	-2.185652	0.0312
RESID(-4)	0.187685	0.179928	1.043112	0.2994
RESID(-5)	0.187752	0.156148	1.202396	0.232

R-squared	0.25796	Mean dependent var	5.49E-16
Adjusted R-squared	0.154074	S.D. dependent var	0.010024
S.E. of regression	0.009219	Akaike info criterion	-6.413973
Sum squared resid	0.008499	Schwarz criterion	-6.055938
Log likelihood	383.8034	Hannan-Quinn criter.	-6.268648
F-statistic	2.483112	Durbin-Watson stat	1.917417
Prob(F-statistic)	0.004627		

As shown in Table 5, we selected to employ five lags of the residuals in computing the test. The test results indicate that the null hypothesis of no autocorrelation should be rejected since the p-values are below 5%. The results of the Breusch-Godfrey test do not agree with the DW test results previously conducted. The Breusch-Godfrey test is deemed a superior test for autocorrelation since it is more comprehensive and reflects

the relationship between an error and several of its lagged values at the same time. According to Brooks (2014), the DW test cannot detect many forms of residual autocorrelation since it only tests for first order autocorrelation.

In order to deal with autocorrelation and heteroscedasticity in the regressions, we employed the Newey-West procedure which produces HAC (Heteroscedasticity and Autocorrelation Consistent) standard errors that are free of both autocorrelation and heteroscedasticity. Brooks (2014) is of the view that moving from a purely static model to one which allows for lagged effects is likely to reduce, and possibly remove, autocorrelation which was present in the static model's residuals. In line with this view, we used the lagged *OIL* price surprise as an independent variable in the regressions since previously observed values of oil prices significantly impact current oil prices and stock returns. A study conducted by Jones and Kaul (1996) showed evidence of statistically significant lagged effects of oil prices on stock returns. We further added two autoregressive terms AR (1) and AR (2) into the regression model to remove any residual autocorrelation.

Multicollinearity is a problem that arises when two or more explanatory variables are highly correlated with each other indicating a very strong relationship between the variables. Multicollinearity is problematic in regression analysis since it can increase the variance of the regression coefficients, thereby making them unstable and difficult to interpret.

Two tests were conducted to investigate the presence of multicollinearity. Firstly, we simply examined a correlation matrix to detect significant pair-wise correlations between the explanatory variables. Secondly, we generated variance inflation factors (VIF) to detect multicollinearity.

The correlation matrix in Table 3 shows that there are no strong significant correlations between the explanatory variables. However, a simple visual analysis of pair-wise correlations can be limiting when investigating multicollinearity between three or more variables. It is possible that a strong collinear relationship exists between three variables

e.g. $x_2 + x_3 \approx x_4$ that cannot be detected by simply looking at the correlation matrix. Since multicollinearity can be difficult to detect among three of more variables, we then make use of the variance inflation factors (VIF) to identify multicollinearity.

The VIF quantifies the severity of multicollinearity in a regression model. VIF shows how multicollinearity has increased the instability or variance of the coefficient estimates (Freund et al., 2000). It indicates how "inflated" the variance of the coefficient is when compared to what it would be if the variable were uncorrelated with any other variable in the model (Allison, 1999). There is no formal criterion for determining whether multicollinearity is reflected by the VIF. However, a generally accepted rule of thumb is that if the VIF of a variable is greater than 10, that variable is said to be highly collinear (Kleinbaum et al., 1998; Gujarati, 2004).

All the explanatory variables had uncentred VIF values ranging from 1.14 to 8.96[3] and centred VIF values ranging from 1.06 to 8.08. These VIF values are less than 10, suggesting that multicollinearity is unlikely to be a major problem with the data set, therefore there is no need to drop any collinear variables.

4.3 Event Study Results

The results of the regression analyses for each individual stock are summarised in Table 6. The event study results indicate that the impact of output (GDP) shocks and current account (CA) shocks dominate all other macroeconomic surprises during the study period. GDP surprises are significant for seventeen individual stocks (out of a total sample of twenty-four stocks), whereas CA surprises are significant for eighteen individual stocks.

The event study results in Table 6 reflect high R-squared and R-squared (adjusted) values for all the individual regressions. The R-squared values range from 66% (BHP Billiton PLC) to 90% (MTN Group Ltd). The high values of R-squared indicate that most

[3] The full comprehensive results of the VIF test are available in the Appendix, Tables 8-31

of the variation in the stock returns is explained by the independent variables included in the model. Since the regression model fits the data well, we proceed with interpreting the event study regression results.

Table 6: Event study results

Log returns of each stock	C	Rm	GDP	CPI	CA	REPO	USFed	OIL	R^2	R^2 (adj)
Anglo American PLC	0.00	0.00	-0.51 ***	0.15	0.06 ***	-0.36	5.04 ***	-0.28 *	0.81	0.80
Anglo American Platinum Ltd	0.00	-0.01	-0.76 ***	-1.43 ***	0.02 *	-2.38 ***	0.76	-0.25	0.84	0.83
Barclays Africa Group Ltd	0.00	0.01	-0.78 ***	-1.23 **	0.06 ***	1.26 *	1.86 ***	-0.09	0.81	0.79
BHP Billiton PLC	0.00	0.04 *	0.10	-0.34	0.01	-2.22 ***	-0.86	0.17	0.66	0.63
Bidvest Group Ltd/The	0.00	0.02	-0.82 ***	-0.07	0.05 ***	1.86 **	-0.64	-0.17	0.80	0.78
Cie Financiere Richemont SA	0.00	0.02	-0.53 *	-0.31	0.07 ***	0.50	0.54	0.02	0.79	0.78
FirstRand Ltd	0.00	0.00	-0.41	0.22	0.02 *	1.01	0.42	-0.16	0.81	0.79
Investec Ltd	0.00	0.00	-0.50 **	-0.46	0.04 ***	2.08 ***	2.82 ***	-0.32	0.80	0.78
Investec PLC	0.00	0.00	0.01	2.29 ***	0.01	0.97	-4.74 ***	-0.06	0.77	0.75
Intu Properties PLC	0.00	0.01	-0.24	-0.35	0.05 ***	0.06	0.50	-0.13	0.81	0.80
MTN Group Ltd	0.00	0.01	-0.77 ***	-0.67 ***	0.04 ***	-0.06	0.10	0.09	0.90	0.89
Nedbank Group Ltd	0.01	0.01	-0.63 ***	-1.04 **	0.01	0.83	1.03 *	-0.21	0.84	0.83
Naspers Ltd	0.00	0.01	-0.85 ***	-0.31	0.02 **	0.94 ***	0.66	-0.10	0.87	0.86
Netcare Ltd	0.00	-0.02 ***	-0.23	0.44	-0.01	1.59 ***	0.65	-0.05	0.78	0.77
Old Mutual PLC	0.01 **	-0.03 *	-0.35 *	-0.52	0.06 ***	0.22	-0.43	-0.17	0.80	0.78
Remgro Ltd	0.00	0.00	-0.45 ***	-0.22	0.02 *	1.29 ***	1.66 **	0.00	0.87	0.86
RMB Holdings Ltd	0.00	0.00	-0.32	-0.31	0.03	1.17 *	-0.77 *	-0.20	0.82	0.80
SABMiller PLC	0.01 ***	0.00	-0.23 *	-0.76 **	0.03 **	-0.07	1.59 ***	-0.10	0.81	0.79
Standard Bank Group Ltd	0.00	0.00	-0.53 ***	-0.48	0.03 *	1.85 **	1.29 ***	-0.14	0.81	0.79
Sanlam Ltd	0.00	0.00	-0.50 ***	-0.22	0.03 ***	0.24	1.01 *	-0.14	0.82	0.80
Steinhoff International Holdings	0.01	-0.01	-0.67 ***	-0.06	0.04 **	2.24	1.39 **	-0.14	0.85	0.84
Sasol Ltd	0.01	0.01	-0.26	-0.32	0.04 ***	0.69	2.11 ***	0.04	0.78	0.76
Tiger Brands Ltd	0.00	0.00	-0.34 **	0.26	0.01	-0.64	0.56	0.04	0.81	0.79
Woolworths Holdings Ltd	0.00	0.01	-0.65 ***	-0.44	0.03 ***	2.15 ***	1.11 **	-0.03	0.85	0.84

Note: The coefficients are significant at: ***1%, **5% and *10% significance levels and have been rounded off to two decimal places

Most of the coefficients on GDP growth are significantly negative predominantly at the 1% significance level. A basis point variation in the GDP growth surprise variable causes a statistically significant decrease in the return of the various individual stocks ranging from -0.23% to -0.85%. With the exception of FirstRand Ltd, all the banking stocks (Barclays Africa Group Ltd, Nedbank Group Ltd, Investec Ltd and Standard Bank Group Ltd) and retail stock (Woolworths Holdings Ltd) have a significantly negative relationship with GDP growth surprises upon immediate impact. It is possible that the element of

surprise in the GDP growth announcements boosts stock market volatility bringing about much uncertainty into the markets. The increased volatility or uncertainly is negatively received by investors resulting in negative stock returns upon immediate impact. These event study results reveal that at the onset, JSE market participants generally do not like GDP growth surprise announcements.

The stock returns of Naspers Ltd are the most sensitive to GDP growth surprises in the entire study sample. A basis point variation in the GDP growth surprise variable causes a decrease in Naspers Ltd's stock return of 0.85%. Naspers Ltd is a multinational media company deriving most of its revenue from internet content (e-commerce websites and classified ads), pay TV and print publishing. Naspers Ltd grows by increasing its subscriber base. Growth in the subscriber base requires a growing economy, increasing GDP growth to boost consumers' disposable incomes which ultimately pay for subscriptions. Therefore, we would expect the stock returns of Naspers Ltd to be highly sensitive to GDP growth surprises.

A large majority of the sample stocks are highly sensitive to CA (as % of GDP) surprises. The CA coefficients on all the individual stocks are consistently positive and statistically significant at the 1% significance level. The only exception is Netcare Ltd where the coefficient on CA is negative and insignificant. A basis point change in the CA surprise variable causes a statistically significant increase in the sample individual stock returns of between 0.02% and 0.07%. This result is consistent with economic theory which asserts that positive current account surprises (lower-than-expected current account deficit) are perceived to be good news by market participants, therefore have a positive effect on stock returns.

The stock returns of Cie Financiere Richemont SA (Richemont) are the most sensitive to CA surprises. A basis point variation in the CA surprise variable causes an increase in Richemont's stock return of 0.07%. Richemont is a manufacturer and retailer of luxury goods, such as jewellery, luxury watches and writing instruments (Bloomberg, 2016). Its associated luxury brands include Cartier, Piaget, Van Cleef & Arpels, Vacheron

Constantin, IWC Schaffhausen, Jaeger-LeCoultre, Panerai and Montblanc. Since Richemont is a well-established company retailing top luxury brands, it enjoys attractive defensive qualities such as strong pricing power in the consumer goods market and attracts wealthy consumers who are largely unaffected by economic cycles. Positive current account surprises lead to a stronger South African Rand (ZAR), ease the pressure on domestic interest rates, boost investor confidence thereby increasing the demand (and stock returns) for a high quality defensive stock such as Richemont. Similarly, SAB Miller PLC, an international brewing and beverage company which is a sought-after defensive stock in the markets is positively influenced by CA surprises. A basis point change in the CA surprise variable causes an increase in the stock returns of SAB Miller PLC by 0.03%.

The event study results show that US Fed rate surprises (USFed) have a significant effect on a number of sample individual stock returns. Thirteen (out of a total sample of twenty-four stocks) are statistically positively affected by USFed surprises. The study period includes the period following the 2008 global financial crisis when US interest rates were kept artificially low by several rounds of quantitative easing. From November 2008 to October 2014, the US Fed injected liquidity into the market via its bond buying programme in order to promote economic growth. This period was dominated by positive US Fed rate surprises (lower-than-expected US interest rates) which led to positive stock price reactions on the JSE. The positive reaction of JSE individual stock returns to lower-than-expected US interest rates indicates that economic theory indeed holds. Theory asserts that lower-than expected US interest rates make US assets less attractive relative to South African assets, leading to capital inflows into higher-yielding South African assets, consequently boosting stock returns on the JSE.

Interestingly, the signs of the USFed coefficients on Investec Ltd and Investec PLC differ. Investec Ltd is significantly positively affected by USFed surprises, in contrast Investec PLC is significantly negatively affected by USFed surprises. This varied reaction to USFed surprises could be attributable to the dual listing of the two entities or the fact that Investec Ltd is the controlling company of the businesses in Southern Africa and Mauritius, whilst Investec PLC is the controlling company of the non-Southern African

businesses. Therefore, investors in Investec Ltd favour positive USFed surprises (lower-than-expected US interest rates) as they make South African assets more attractive relative to US assets. Whereas investors in Investec PLC seem to dislike the lower-than-expected US interest rates, especially since the Bank of England has followed a similar pattern to that of the US in recent years. Conover et al. (1999) showed that the monetary environments of the UK closely follow the US monetary environment, these two exhibit high correlations. Therefore lower-than-expected US interest rates heighten the prospect of a rate cut in the UK which would make UK assets less attractive to investors relative to higher yielding emerging market assets.

The coefficients on OIL were mostly negative but insignificant for all the individual stocks in the sample except for Anglo American PLC which had a negatively significant coefficient on OIL of -0.28%. Similarly a study by Shammas (2012) found that the South African stock market has a small and slow reaction to oil shocks. Theorists would generally expect a negative correlation between OIL and stock returns to prevail. Surprisingly lower (higher) oil prices support (hurt) stock prices by lowering (increasing) input costs for businesses leading to higher (lower) profit margins that boost (reduce) stock returns.

The REPO surprises are significant for eleven individual stocks (out of a total sample of twenty-four stocks). The coefficients on the REPO are positive for the banking stocks (Barclays Africa Group Ltd, FirstRand Ltd, Investec Ltd, Standard Bank Group Ltd and Nedbank Group Ltd) and negative for the resource stocks (Anglo American PLC, Anglo American Platinum Ltd and BHP Billiton PLC).

Banking stocks are typically sensitive to interest rate shocks. They have a strong positive correlation with surprise REPO hikes since banking profits are a function of prevailing interest rates. This is because bank net interest margins (the difference between interest income that banking institutions generate and the interest they pay to lenders) benefit from higher interest rates. Amongst the banking stocks in the study sample, the stock returns of Investec Ltd are the most sensitive to REPO surprises. A basis point variation

in the REPO surprise variable causes an increase in Investec Ltd's stock returns of 2.08%. As the smallest of the big five banks in South Africa, Investec Ltd tends to have an aggressively priced loan book in order to attract lending deal flow and offers relatively high deposit rates in order to attract depositors thereby making Investec Ltd relatively vulnerable and very sensitive to interest rate changes.

The stock returns of Remgro Ltd are highly responsive to REPO surprises, the REPO coefficient is positively significant at the 1% level. A basis point change in the REPO surprise variable causes an increase in the stock returns of Remgro Ltd by 1.29%. Remgro Ltd is a well-diversified investment holding company with interests in banking and financial services, medical services, packaging, glass products, wine, spirits, food, home and personal care products (Bloomberg, 2016). Remgro holds investments in many well-established companies such as FirstRand Bank, RMB Holdings, RCL Foods, Distell, MediClinic Corp, Unilever SA, Total SA and many others. According to Remgro Ltd's annual report for the year ended 31 December 2015, their banking investments made the highest contribution (35%) to headline earnings. Similar to the individual banking stocks, Remgro's heavy reliance on banking revenues may contribute to the stock's high interest rate sensitivity.

Ceteris paribus, we would expect the resource stock returns to be sensitive and negatively correlated with REPO surprises. Capital intensive, cyclical industries which include resource sector stocks tend to be most sensitive to REPO surprises (Ehrmann & Fratzcher, 2004). The event study results show that a basis point variation in the REPO surprise variable causes a statistically significant decrease in the returns individual resource stocks, Anglo American Platinum Ltd (-2.38%) and BHP Billiton (-2.22%). Higher-than-expected rate hikes significantly increase the cost of capital in the capital-intensive resource sector thereby negatively impacting stock returns. This finding is consistent with results from Gupta and Reid (2013) that found that capital intensive industries such as mining, gold mining, resources, and general industrials have consistently negative REPO coefficients which are more sensitive than the ALSI.

With regards to inflation surprises, the CPI coefficients for Anglo American Platinum Ltd, Barclays Africa Group Ltd, MTN Group Ltd, Nedbank Group Ltd and SAB Miller PLC are consistently negative and statistically significant. A basis point variation in the inflation surprise variable causes a statistically significant decrease in the return of these individual stocks of between -0.76% and -1.43%. These results confirm the theoretical inverse relationship between CPI surprises and stock returns. The negative relationship between inflation shocks and South African stock returns was most recently documented by Gupta and Reid (2013). They found that CPI surprises significantly reduce stock returns upon immediate impact.

The stock returns of Anglo American Platinum Ltd are the most sensitive to inflation surprises. Economic theory asserts that a positive inflation surprise (higher-than-expected CPI) is associated with increased input costs. In the case of Anglo American Platinum Ltd, unexpectedly higher inflation causes cost inflation challenges. Higher labour costs (wage inflation) and electricity costs exert significant pressure on the mining firm, making it less profitable and less attractive to investors. The 2015 annual report for Anglo American Platinum Ltd highlighted that cost inflation continues to be a challenge for the company, with labour, electricity and foreign currency denominated input costs under inflationary pressure. With investors aware of these on-going inflationary cost pressures, it makes sense that the stock returns of Anglo American Platinum are significantly negatively impacted by inflation surprises at the 1% level.

Whilst inflation increases input costs, it also reduces the purchasing power of consumers since price inflation decreases the number of products and services consumers are able to purchase with their income. Therefore, inflation surprises have a negative effect on consumer demand. Ceteris paribus, we expect the stock returns of a consumer goods stock such as SAB Miller PLC to have a negative relationship with inflation surprises. The event study results confirm this negative relationship showing that a basis point variation in the CPI surprise variable causes a decrease in the stock returns of SAB Miller by -0.76%.

MTN Group Ltd is a multinational telecommunications company with operations in more than 20 countries (Bloomberg, 2016). The results of the event study indicate that the stock returns of MTN Group Ltd have a significant negative relationship with CPI surprises upon immediate impact. Over the sample period, not only were the company's earnings adversely affected by inflationary pressures in South Africa, but also by hyperinflation in Iran, Syria and Sudan which are key operations for MTN Group Ltd. A basis point variation in the CPI surprise variable causes a decrease in the stock returns of MTN Group Ltd of -0.67%. It can be said that the stock returns of MTN Group Ltd are sensitive to the effects of unexpectedly high inflation announcements.

The JSE Top 40 Index (Rm) was introduced into the regression as a market proxy to capture the market-wide effects at equilibrium. Its role as an additional variable in the study is to control for the effect of the market index on the individual constituent stock returns. It shows how the actual return on the market index is related to the individual stock returns. Rm is essentially the beta measure looking at the tendency of individual stocks to respond to swings in the market. A beta of less than 1 indicates that the individual stock is less volatile than the market, while a beta greater than 1 indicates that the individual stock is more volatile than the market. Therefore, risk averse investors would prefer low beta stocks since they have low market risk.

The event study results show that the Rm coefficients are predominantly positive, less than one and largely insignificant. Based on these results, we would conclude that beta has no predictive power for returns on the JSE. This conclusion is contrary to the widely used CAPM model framework. Only three individual stocks (out of a total sample of twenty-four stocks) are statistically significant, these include BHP Billiton PLC, Netcare Ltd and Old Mutual PLC. For Netcare Ltd and Old Mutual PLC, the Rm (or beta coefficient) is negative indicating an inverse relationship between beta and the individual stock returns. This result is contrary to the positive relationship asserted by finance theory. It is a somewhat surprising result but was previously observed and documented by Van Rensburg and Robertson (2003) in a past study using FTSE-JSE All-Share Index as a market proxy. In light of these mixed results, we conclude that beta is irrelevant as far as

return generation on the individual JSE sample stocks is concerned, at least based on a market proxy of the JSE Top 40 Index.

4.4 Robustness Tests

In earlier studies, Roll (1977) and Bowie and Bradfield (1993) warned that the choice of the wrong market proxy can reduce the predictive ability of the CAPM. Similar studies such as Harvey and Siddique (2000), Fama and French (2004), have voiced this concern. It is widely believed that the use of a wrong representative portfolio in the equilibrium CAPM model can result in a total failure of the model. Therefore, it is possible that the use of the JSE Top 40 Index as a market proxy is inappropriate leading to the results of the study being misstated.

In an effort to further test the predictive power of the market index or JSE Top 40 Index on the individual constituent stocks, we substituted Rm with the “surprise return on the market” (RmSup) as a regressor in the regression analysis. Therefore, RmSup was included as an independent variable in the event study regression. The results of the regression analysis including the RmSup are summarized in the Appendix, Table 32.

The event study results in Table 32 show that RmSup is statistically insignificant for all the individual stocks included in the study sample. Interestingly the R-squared values for most of the individual regressions marginally increased after the inclusion of RmSup, however the Adjusted R-squared values generally fell. According to Brooks (2014), the general rule for determining whether a given variable should be included in a regression or not is: include the additional variable if Adjusted R-squared rises and do not include it if Adjusted R-squared falls. Therefore, based on this decision-making tool we drop the RmSup variable from the regression model since it leads to lower R-squared values. It follows that the original regression model contained in Table 6 still holds for our study.

For comparative purposes and to test the robustness of our main event study results, we re-estimate our event study regressions excluding both Rm and RmSup to simulate an

Arbitrage Pricing Theory (APT) model. The results of the regression analysis are shown in the Appendix, Table 33. Similar to our main event study, the results show robust evidence that the sample individual stock returns are mostly sensitive to GDP growth and CA surprises.

For completeness, we re-estimate our regressions over the same sample period using the simple traditional definition (2) of macroeconomic "surprise" variables that was used by Gupta and Reid (2013). This definition is generally used in literature and does not incorporate a strict variability criterion (i.e. two standard deviations from the mean) to identify significant variations from the median forecast. The event study regression results based on this simple "surprise" definition are contained in the Appendix, Table 34.

We compared the event study results generated using our newly defined "surprise" variables which incorporates two standard deviations from the mean (see Table 6) vs the event study results generated using the simple "surprise" definition (see Appendix, Table 34). We found that consistent with the results of our main study, GDP and CA shocks dominate all other macroeconomic surprises in Table 34. Therefore, our broad conclusion that output (GDP growth) and current account (CA) surprises significantly impact individual stock returns in South Africa still holds.

Most notably the R-squared and R-squared (adjusted) values using the simple traditionally defined "surprises" are lower than the R-squared and R-squared (adjusted) values using the newly defined "surprises". This implies that:

1) we have derived a more robust "surprise" definition in our study, and
2) the regression model generated using the new robust definition of macroeconomic "surprises" is a better fit or actually fits the data better.

Therefore, the results of our study appear to be justified and robust. It can be said that incorporating the variability measure as a stricter criterion in our "surprise" definition improved the overall predictive accuracy of our model and added value to our study.

4.5 BVAR Results

In order to analyse the dynamic relationships between the individual stock returns and the macroeconomic surprises, we generated impulse response functions over one to twelve-month period and used the BVAR estimates[4].

Firstly, we observed the impulse response functions for three resource stocks (Anglo American PLC, BHP Billiton PLC and Sasol Ltd) following a one standard deviation increase in the macroeconomic surprise variables and the market index (Rm). Figures 8-10 show the impulse response functions for each individual resource stock.

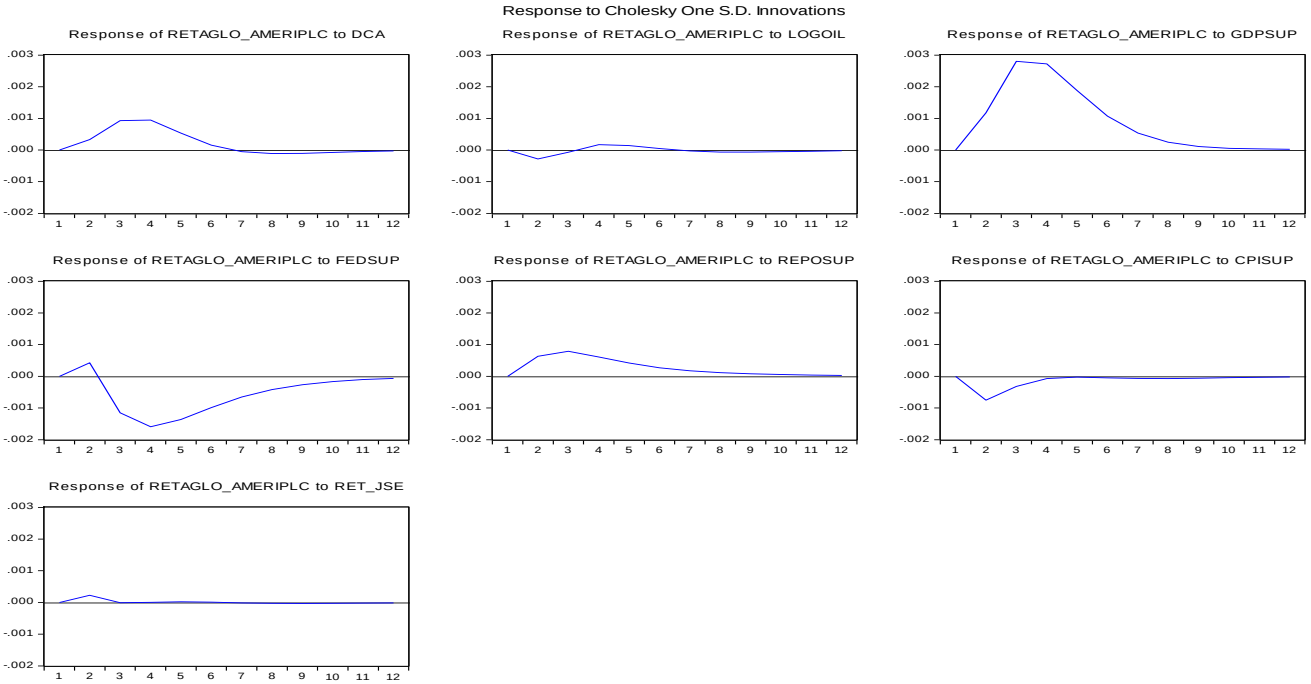

Figure 2: Impulse response functions of Anglo American PLC returns to one standard deviation shock to six macroeconomic surprises and Rm (RET_JSE)

As displayed in Figure 2, following the CA surprise, the stock returns on Anglo American PLC peak between the third and the fourth month reaching a maximum magnitude of 0.001%. The effect stays positive until the sixth month. A one standard deviation shock to the OIL surprise marginally decreases the stock returns of Anglo American PLC following the shock, but the effect is insignificant. The GDP surprise causes the stock

[4] The BVAR estimates tables are included in the Appendix, Tables 34-57

returns to stay positive throughout the twelve-month period, significantly peaking in the third month. The USFed surprise causes the stock returns of Anglo American PLC to increase by a small percentage for the first two months after the shock, thereafter the stock returns decrease and stay negative over the entire twelve-month period. The REPO surprise has a positive effect on the stock returns of Anglo American PLC, peaking in the third month post the shock. A one standard deviation shock to CPI decreases the stock returns, with the maximum effect being observed in the second month following the shock. The market return (RET_JSE) effects are small and insignificant.

Based on the impulse response functions, the CA, GDP and USFed surprises have the most significant effects on the stock returns of Anglo American PLC. This is displayed in the large magnitude of the effects on the stock returns after immediate impact. Similarly, the event study also showed that the stock returns of Anglo American PLC are most sensitive to these three macroeconomic surprises. Interestingly, if we jointly interpret the GDP results of the event study and the BVAR model, we can conclude that initially the stock returns of Anglo American PLC are initially negatively affected by GDP surprises. However, following the GDP shock, the stock returns significantly increase and stay positive throughout the twelve-month period. It is possible that the markets react negatively at the onset in response to the surprise element of the GDP announcement, but once the markets have digested the surprise news announcement and the element of surprise or uncertainly has died down, the stock returns pick up and stay positive for the entire twelve-month period.

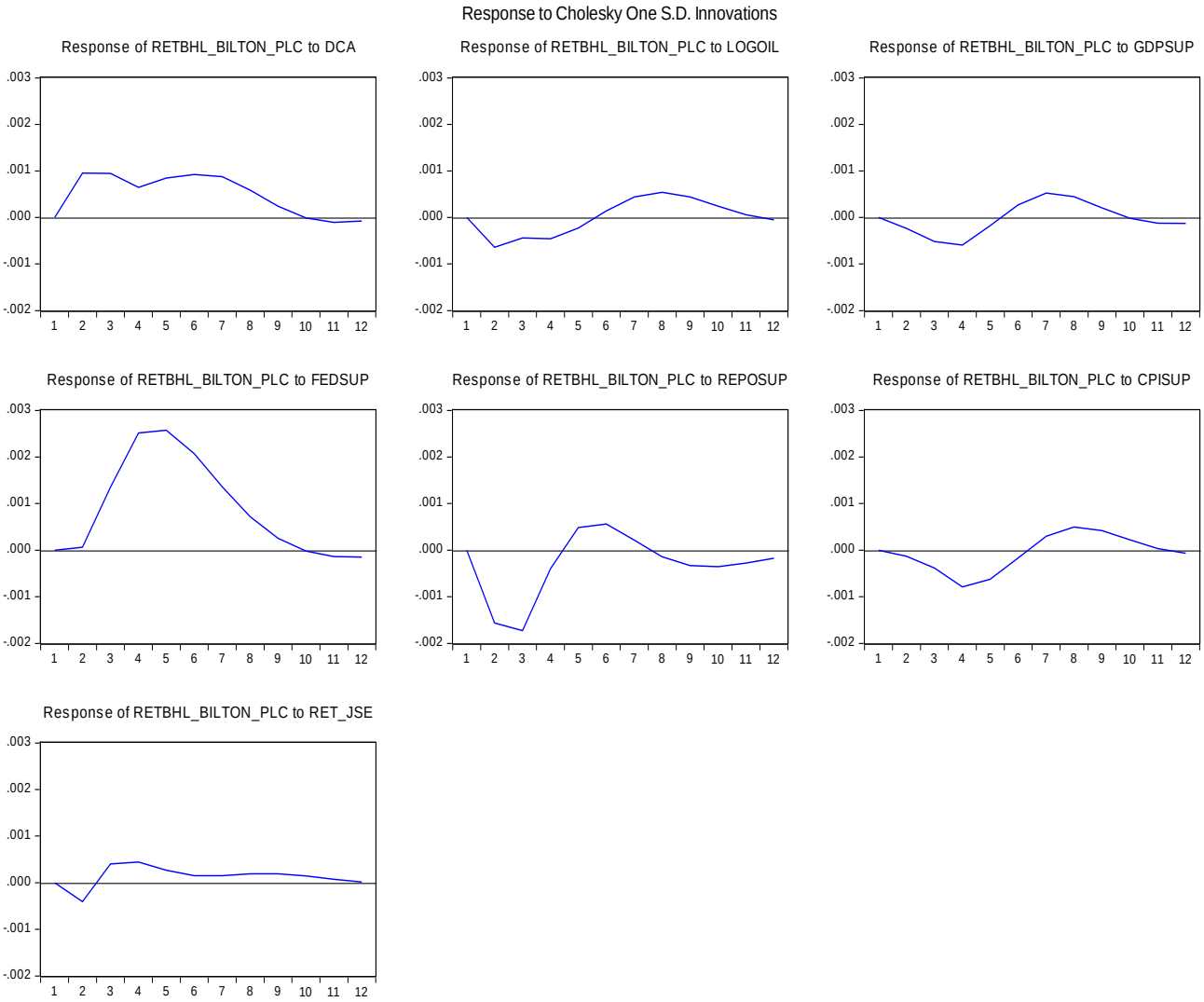

Figure 3: Impulse response functions of BHP Billiton PLC returns to one standard deviation shock to six macroeconomic surprises and Rm (RET_JSE)

The impulse response functions for BHP Billiton PLC in Figure 3 show that whilst USFed surprises do not initially have a significant effect on the stock returns, two months following the shock, the stock returns increase, reaching peak levels in the fourth month. The effect is positively significant and stays positive until the tenth month. BHP Billiton PLC stock returns reaction to OIL surprises closely mirror those of Anglo American PLC. A marginal decrease in the first two months post the shock, the magnitude of the effect does not go beyond -0.001%. Following a one standard deviation shock to the CA surprise variable, the stock returns increase in the first month and remain consistently positive until the tenth month. It appears that REPO surprises cause much volatility to the stock returns

of BHP Billiton PLC post the shock. The impulse response function indicates that REPO surprises decrease stock returns in the first three months following the shock. However, the stock returns start to recover after the third month, moving to positive returns territory by the fifth month. Again, the market return effect is relatively insignificant. Therefore, the BVAR model results reveal that whilst USFed surprises initially appear insignificant in the event study, they do play a significant role in determining the stock returns on BHP Billiton PLC following the shock. Apparently the markets do not initially overreact to USFed surprise announcements, but only after two months of properly analysing the data do they start making significant changes to their holdings of BHP Billiton PLC in response to the USFed shock.

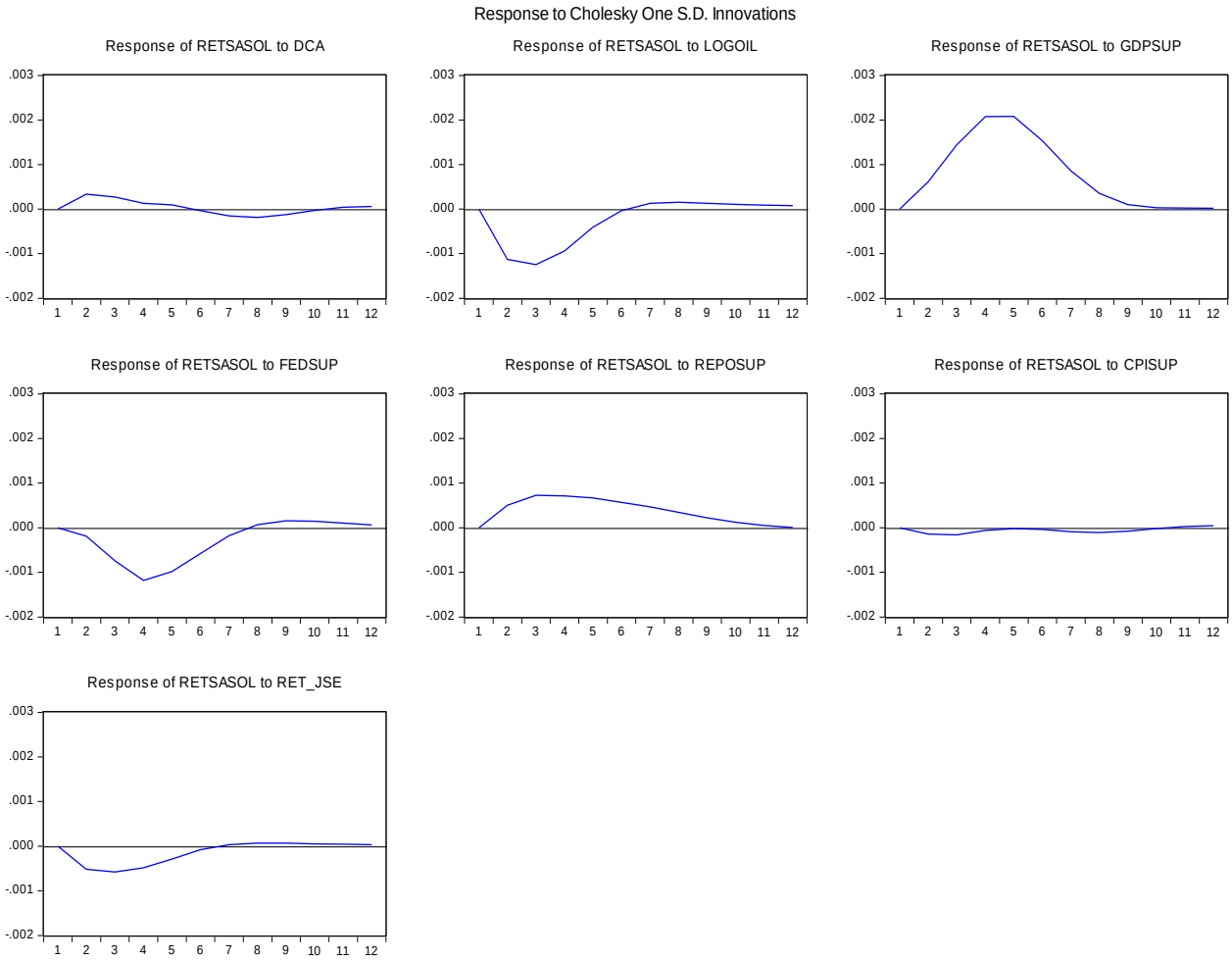

Figure 4: Impulse response functions of Sasol Ltd returns to one standard deviation shock to six macroeconomic surprises and Rm (RET_JSE)

With regards to Sasol Ltd, the impulse response functions in Figure 4 indicate that GDP surprises have a significant effect on the stock returns. In the event study, GDP surprises had an insignificant impact on Sasol Ltd's stock returns at immediate impact. A close analysis of the BVAR result in conjunction with the event study result reveals that Sasol is only sensitive to GDP growth surprises following the shock. The stock returns of Sasol are positively impacted by GDP growth surprises post the GDP growth surprise announcement throughout the twelve-month period. OIL surprises appear to have a significantly negative effect on the stock returns for the first six months after the shock. At immediate impact and post the shock, CPI surprises have a very small insignificant effect on the stock returns of Sasol. USFed surprises causes the stock returns of Sasol to decrease and stay negative up to the eighth month, the maximum negative effect is observed in the fourth month.

Based on the BVAR dynamics, the GDP growth and USFed surprises have the largest effect on the individual resource stock returns in the sample. This makes intuitive sense since strong economic growth is a key driver of demand for resources, and during the sample period, US Fed announcements largely impacted emerging stock markets, especially those with liquid currencies (such as the South African Rand) via carry trade activities.

We now examine and compare the impulse response functions for the individual banking stocks (Barclays Africa Group Ltd, Investec Ltd, FirstRand Ltd, Nedbank Ltd and Standard Bank Ltd). When we compare the impulse response results of the five banking stocks displayed in Figures 5-9, we immediately observe that GDP growth surprises have a significant positive effect on the individual banking stock returns. Following the GDP growth shock, the banking stock returns patterns mirror each other peaking in the fifth month. This implies that investors in banking stocks should adopt a five-month holding period (at the very least) post GDP growth surprises. According to the event study, GDP growth surprises cause negative stock returns at the onset. However, the BVAR results show that post immediate impact the returns pick up and stay positive during the twelve-

month period. These findings are consistent with widely hypothesised economic theory that a positive long term relationship exists between GDP growth and stock returns.

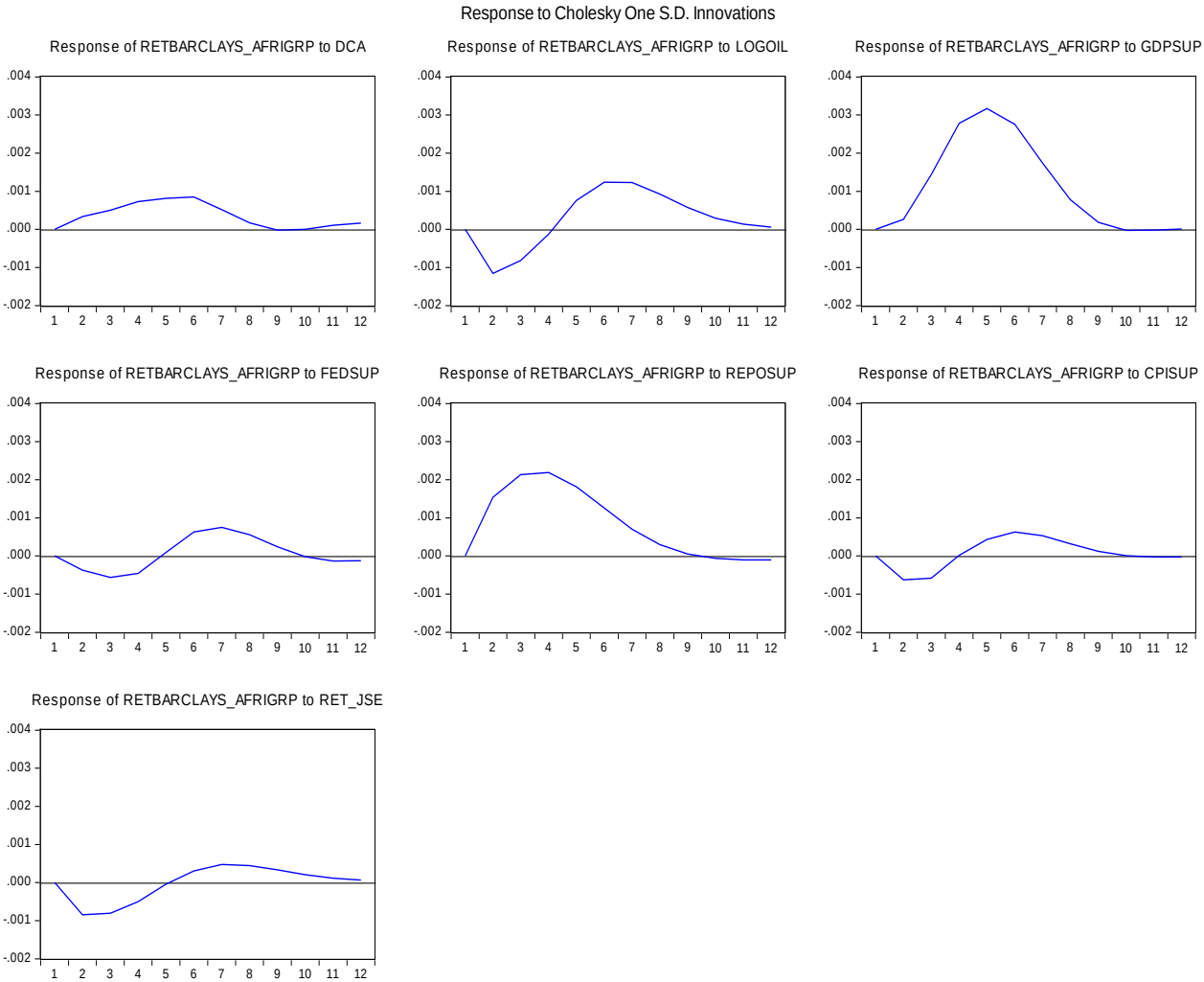

Figure 5: Impulse response functions of Barclays Africa Group Ltd returns to one standard deviation shock to six macroeconomic surprises and Rm (RET_JSE)

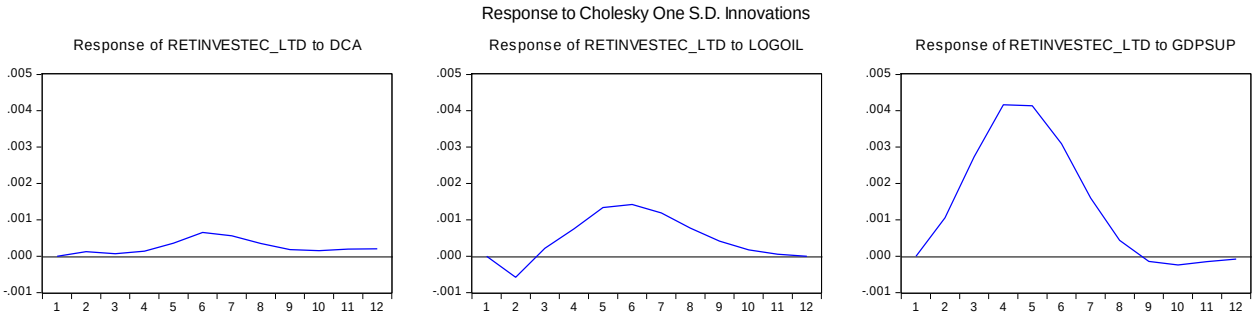

Figure 6: Impulse response functions of Investec Ltd returns to one standard deviation shock to six macroeconomic surprises and Rm (RET_JSE)

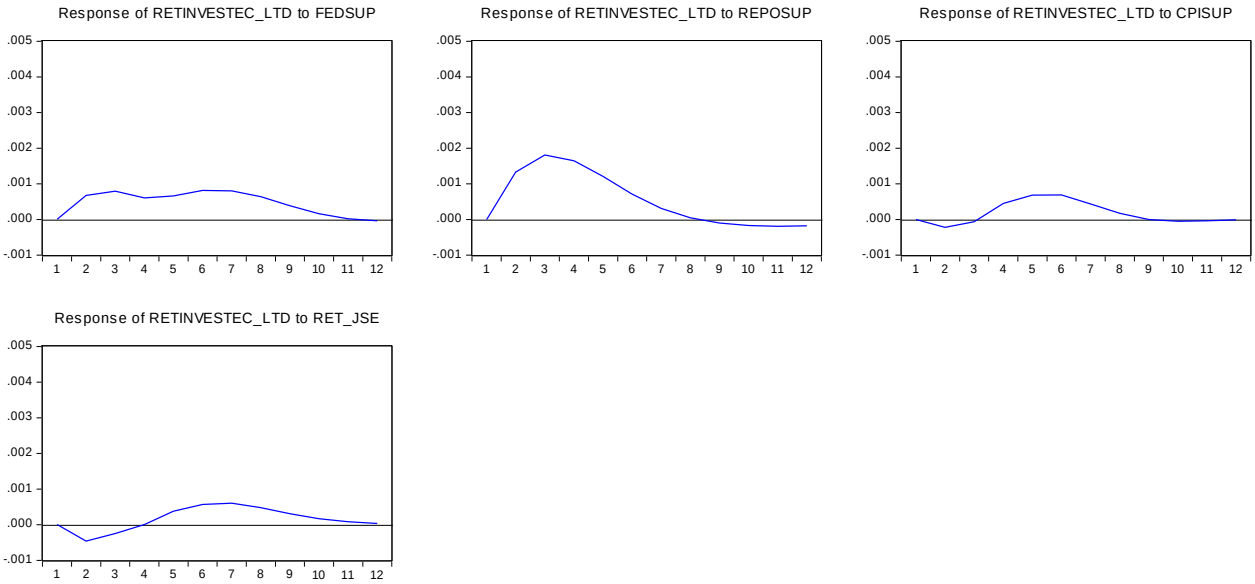

Figure 6 continued: Impulse response functions of Investec Ltd returns (continued)

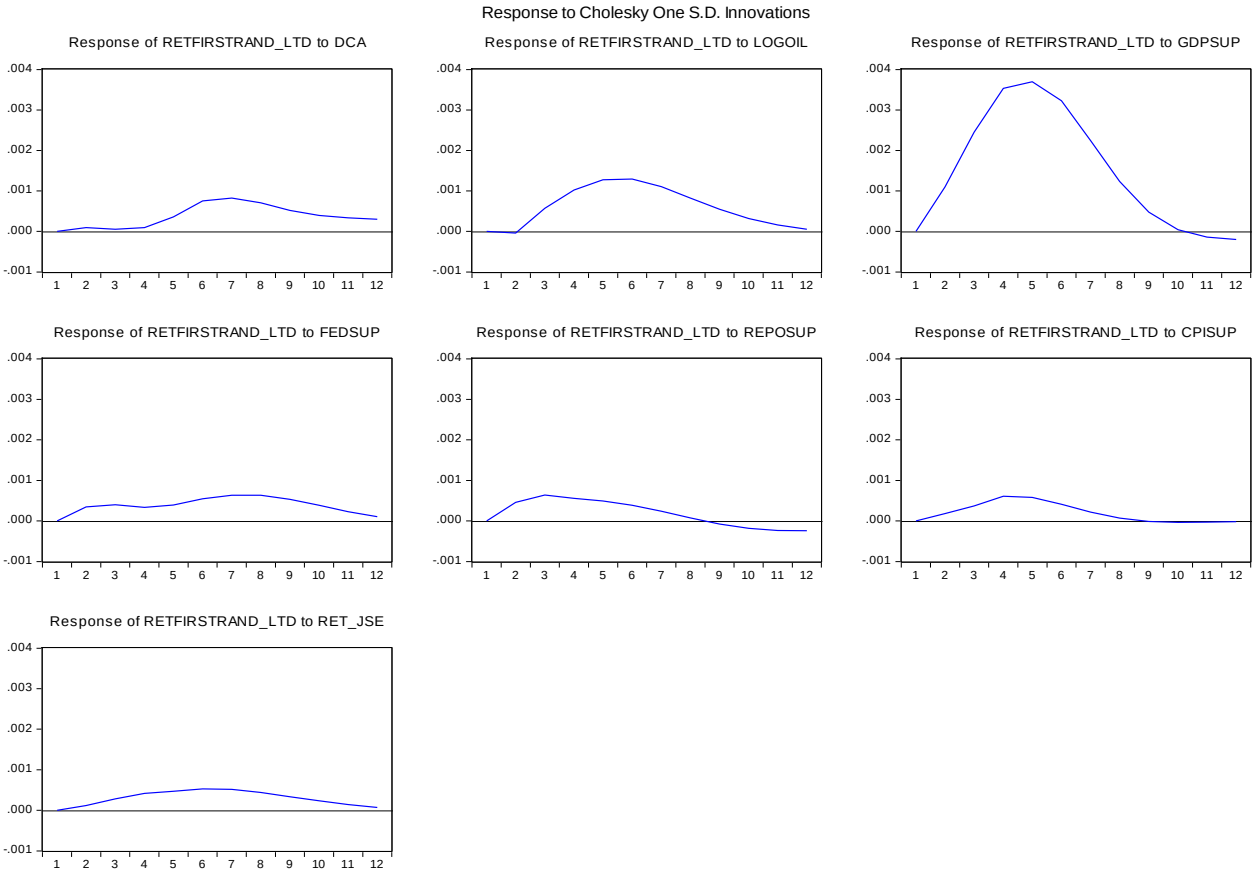

Figure 7: Impulse response functions of FirstRand Ltd returns to one standard deviation shock to six macroeconomic surprises and Rm (RET_JSE)

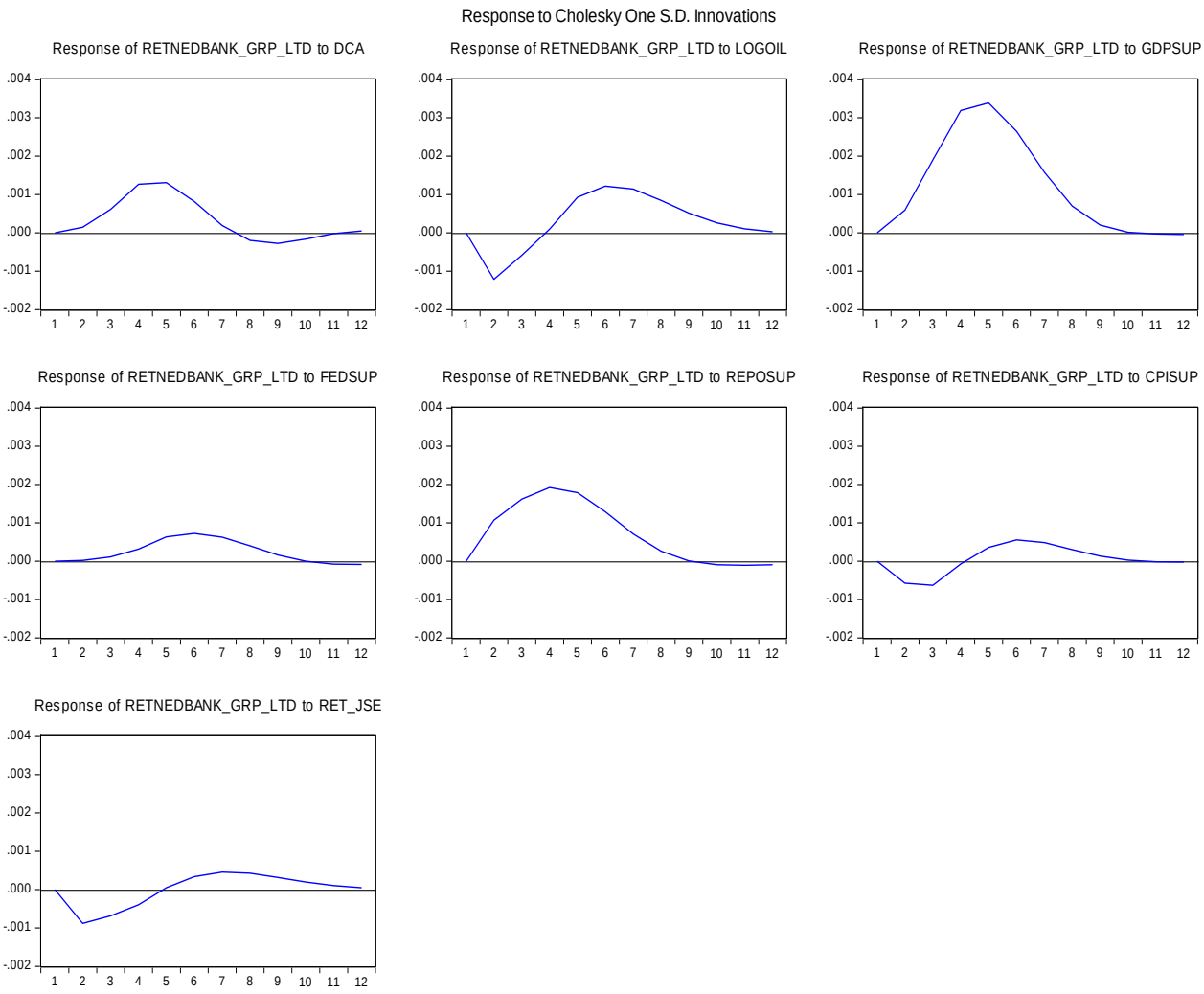

Figure 8: Impulse response functions of Nedbank Group Ltd returns to one standard deviation shock to six macroeconomic surprises and Rm (RET_JSE)

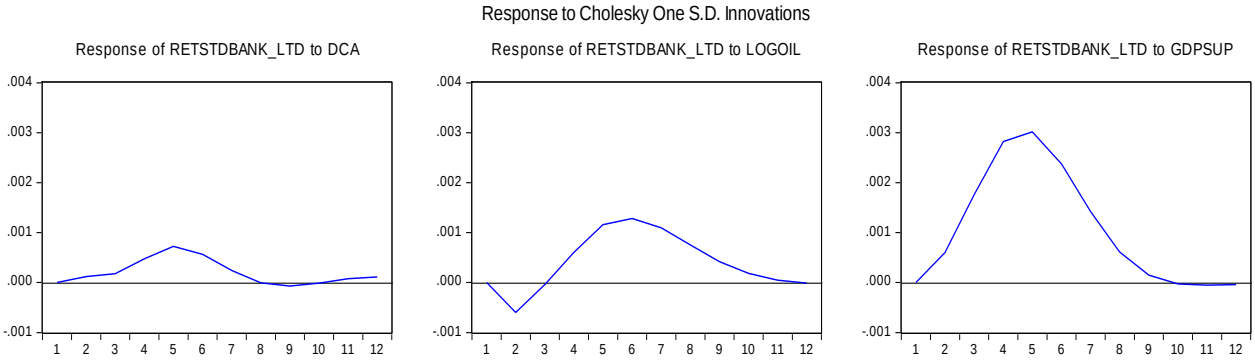

Figure 9: Impulse response functions of Standard Bank Group Ltd returns to one standard deviation shock to six macroeconomic surprises and Rm (RET_JSE)

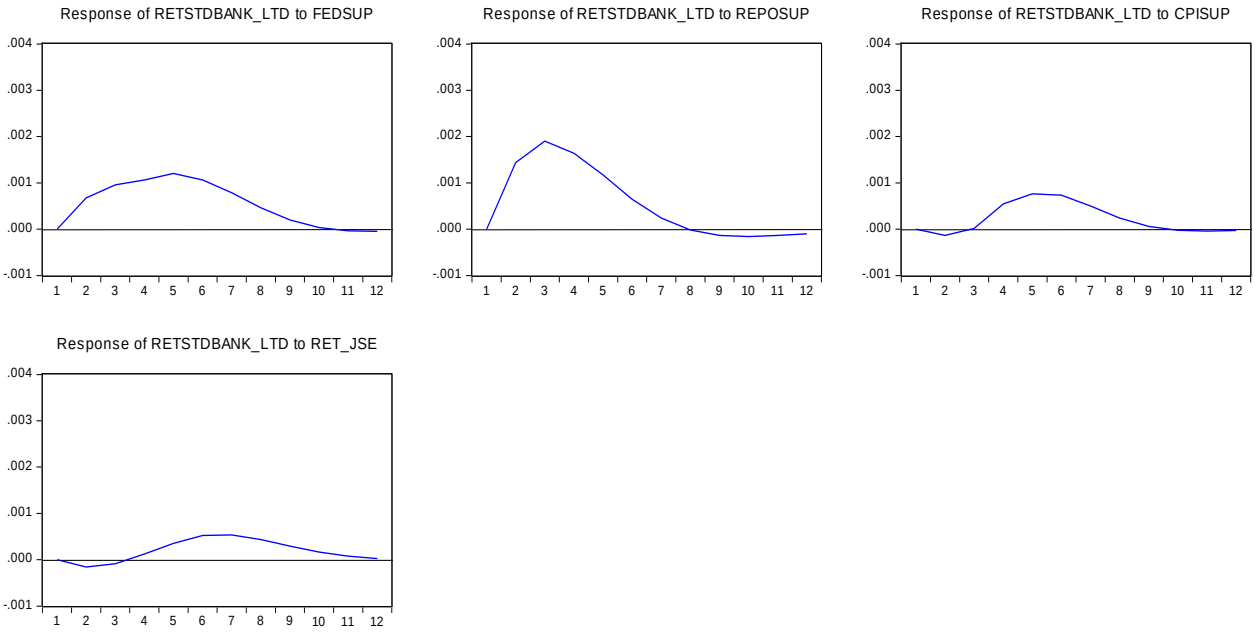

Figure 9 continued: Impulse response functions of Standard Bank Ltd returns (continued)

As expected all the banking stocks are significantly responsive to REPO surprises since interest rate movements affect banking profitability. The magnitude of the effects on the stock returns is relatively large. Following a REPO surprise, all the individual banking stock returns remain positive from the first month until the eight month.

Figure 16 shows the impulse response functions of Bidvest Group Ltd. This is a diversified holding company in freight services, food products, automobile sales and manufacturing with operations on five continents (Bloomberg, 2016). The BVAR results indicate that post immediate impact from a GDP surprise, the stock returns of Bidvest Group Ltd significantly increase from the first month peaking in the fourth month. The effect stays positive until the eighth month where it starts dipping into negative returns for the rest of the period. It is evident that local economic growth is a material factor even for an internationally diversified business such as the Bidvest Group.

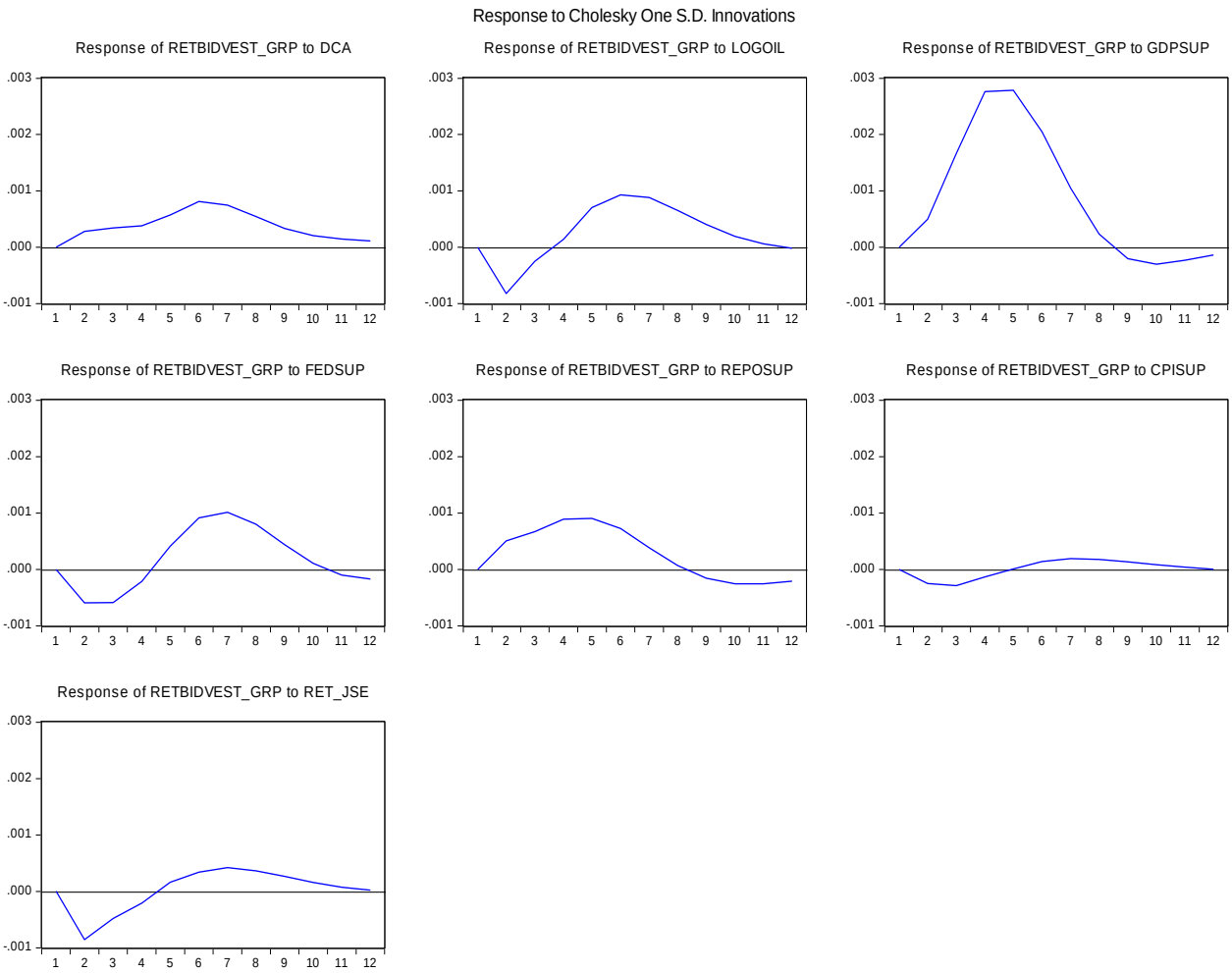

Figure 10: Impulse response functions of Bidvest Group returns to one standard deviation shock to six macroeconomic surprises and Rm (RET_JSE)

The BVAR results for Intu Properties PLC are reflected in Figure 11. Intu Properties is one of UK's biggest listed property companies (or REITs) that owns and operates retail shopping centres in multiple countries. Intu Properties PLC has a secondary listing on the JSE. As expected, a property company focused on retail shopping centres is largely affected by unexpected economic growth (GDP) announcements. Whilst the event study shows that the initial impact on the stock returns may be statistically insignificant, the impulse response functions indicate that the effects on stock returns are significant at longer horizons. The GDP surprise significantly increases the stock returns over the twelve-month period, peaking in the sixth month following the shock. Intu Properties PLC is also significantly affected by USFed surprises initially dipping into negative returns post the shock, but eventually increasing to positive returns territory to peak in the seventh

month. The stock returns remain positive for the entire twelve-month period. Intu Properties PLC is attractive to investors as a rand hedge stock, therefore investors have to pay particular attention to international developments, especially USFed rate announcements which may adversely or favourably impact the South African Rand (ZAR) and consequently, their stock returns from Intu Properties PLC.

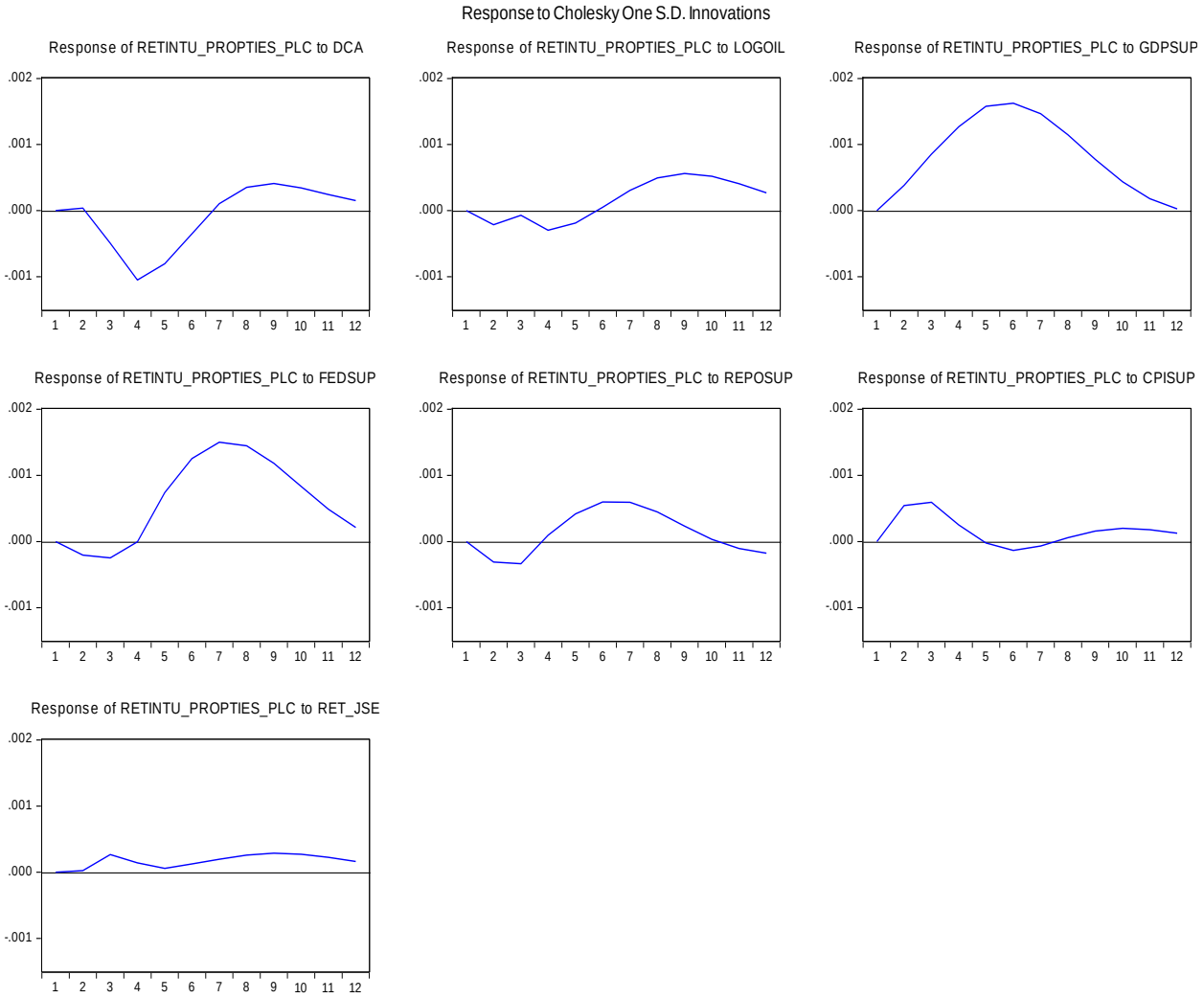

Figure 11: Impulse response functions of Intu Properties PLC returns to one standard deviation shock to six macroeconomic surprises and Rm (RET_JSE)

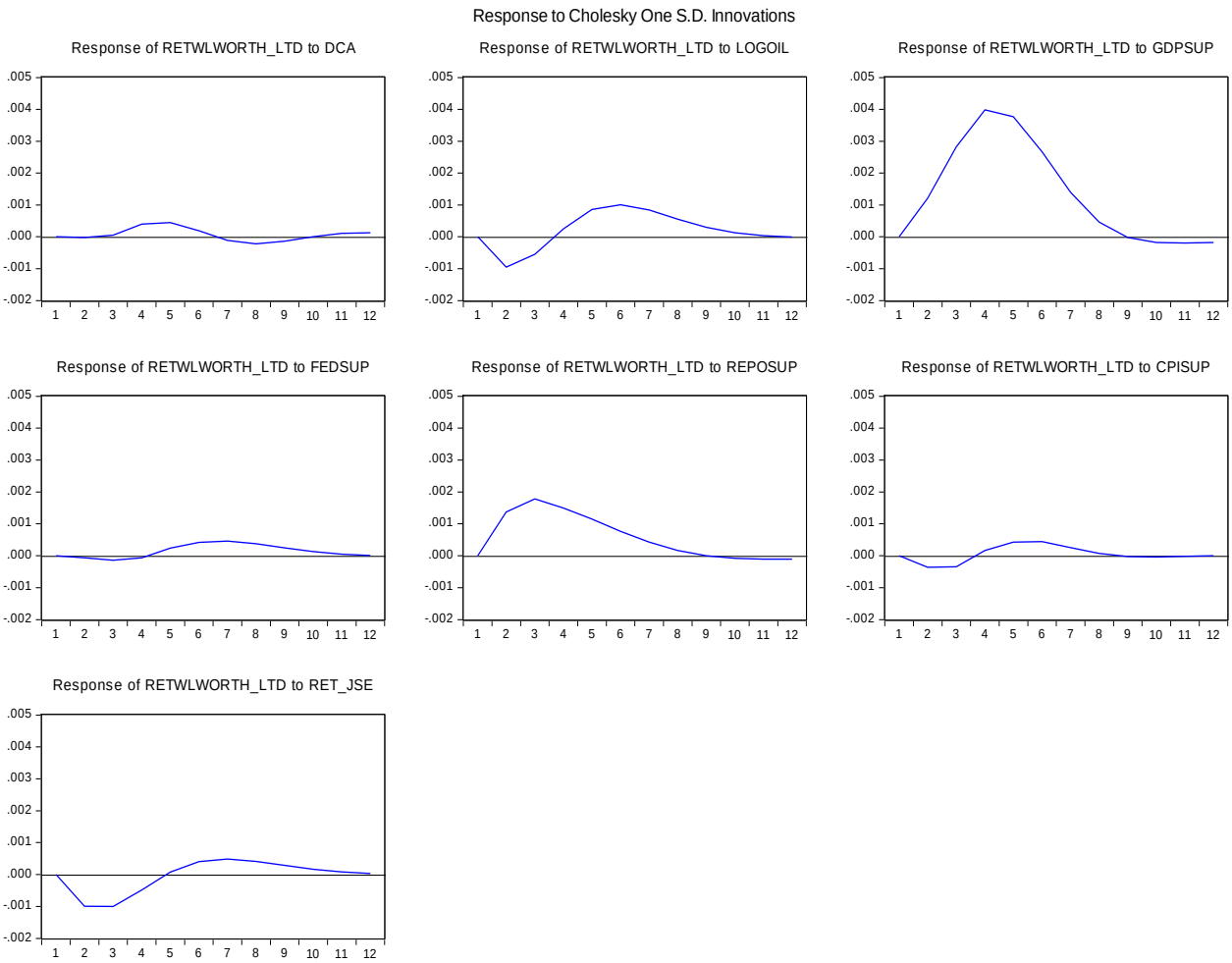

Figure 12: Impulse response functions of Woolworths Ltd returns to one standard deviation shock to six macroeconomic surprises and Rm (RET_JSE)

The impulse response functions for Woolworths Ltd in Figure 12 show that the stock returns of the retailer are significantly impacted following the GDP surprise and the REPO surprise. The GDP surprise causes stock returns to increase peaking in the fourth month. The effect is very significant. Following the REPO surprise the stock returns of Woolworths Ltd peak in the third month and then start to fall reaching negative returns in the ninth month. It is possible that it takes approximately three months for the negative effects of the higher REPO to be felt by overly indebted consumers and the investment community. The retail sector requires a strong growing economy and strong consumer confidence in order to boost sales volumes. A slowing economy and rising interest rates (which increase consumer indebtedness) are not good for retail stocks like Woolworths Ltd. Woolworths Ltd is considered to be an upper-to-premium brand retailer, therefore in

unfavorable macroeconomic conditions, it loses some consumers as they trade down to more affordable retailers.

With regards to SAB Miller PLC, the impulse response functions in Figure 13 clearly indicate significant effects emerging from CA and GDP surprises. The effects on the stock returns are significant at longer horizons following the shocks. The stock returns peak following the CA surprise in the sixth month, whilst the returns peak in the fourth month following a GDP surprise. By virtue of being a consumer goods stock, we would expect SAB Miller PLC to be sensitive to GDP shocks as GDP is an important indicator of consumer spending and reflects how the economy is performing.

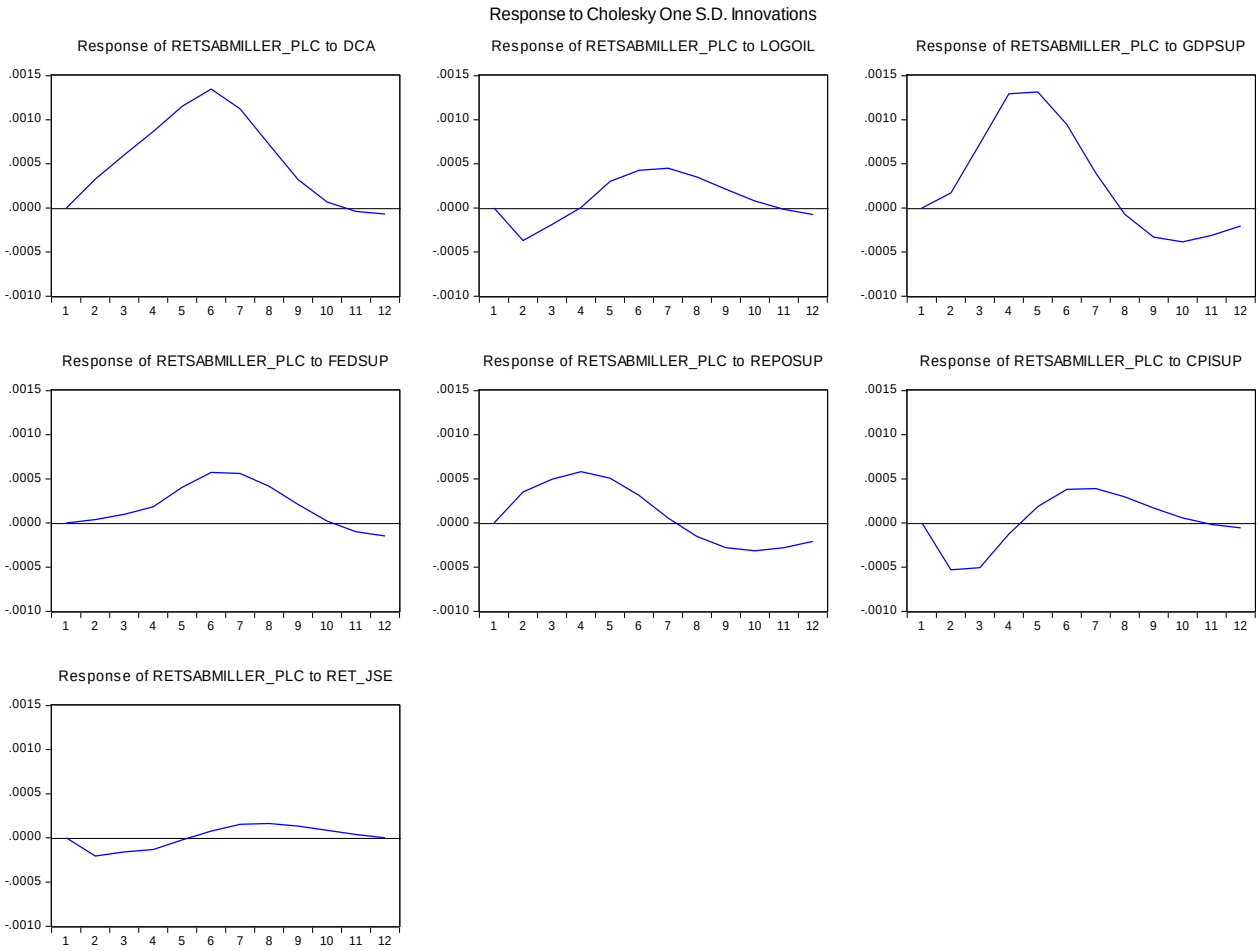

Figure 13: Impulse response functions of SAB Miller PLC returns to one standard deviation shock to six macroeconomic surprises and Rm (RET_JSE)

From the event study results and the BVAR analysis, the following key points emerge:

- Upon immediate impact, GDP growth and CA surprises dominate all other macroeconomic surprises in the event study.
- At the onset, GDP growth shocks cause individual stock returns to turn negative in reaction to the surprise announcement. However, at longer horizons, once investors have fully assimilated the element of surprise in the GDP growth news, stock returns significantly increase. Therefore, in the long run, GDP growth surprise news have a positive effect on individual stock returns as widely hypothesised in economic theory.
- In addition to GDP growth and CA surprises, we also found significant effects emerging from USFed shocks in the BVAR analysis. This implies that foreign investors looking to invest in actively traded and liquid currency emerging markets like South Africa should be aware of the significant effect that unexpected USFed rate announcements have on emerging market stock returns.
- Individual banking stocks (Barclays Africa Group Ltd, Investec Ltd, FirstRand Ltd, Nedbank Ltd and Standard Bank Ltd) are significantly responsive to REPO surprises because interest rate movements affect banking profitability. The smallest of the banking stocks in the study sample, Investec Ltd, is the most sensitive to REPO surprises.
- Individual resource stocks (Anglo American PLC, BHP Billiton PLC and Sasol Ltd) are sensitive and negatively correlated with REPO surprises since interest rates can significantly impact the cost of capital in the capital-intensive resource sector.
- The stock returns of retail stock (Woolworths), property stock (Intu Properties PLC) and consumer goods stocks (Richemont and SAB Miller PLC) are sensitive to GDP growth shocks. This result is in line with expectations since these stocks require a strong growing economy to boost consumer demand and retail sales revenues.

5 CHAPTER 5: CONCLUSION

The relationship between macroeconomic surprises and aggregate level stock returns has been the subject of many past studies. However there remains a scarcity of research studies showing how a wide range of macroeconomic surprises specifically impact individual stock returns at the firm level. The aim of this study was to fill this gap in literature whilst focusing on the individual constituent stocks of the FTSE/JSE Top 40 Index in South Africa.

This study extends the prior study methodology employed by Gupta and Reid (2013) by introducing a more robust definition and stricter criteria for the "surprise" variables. We also extend the analysis by introducing three additional independent variables (Rm, USFed, OIL) into the study that are deemed relevant to the current South African stock market landscape.

It follows that the macroeconomic surprises considered in the study include Gross Domestic Product (GDP) growth, Consumer Price Index (CPI), Current Account (CA) as a % of GDP, Official Repurchase rate (REPO), US Federal Reserve (USFed) and the Oil price (OIL). The Market Return (Rm) is included to model the effect of the market index on the individual stock returns. The study sample period ranges from January 2005 to December 2015. This research report initially used the event study to identify the most dominant macroeconomic shocks and the immediate impact of the shocks on individual stock returns. Then the BVAR analysis was employed to study the dynamic effects of the shocks post immediate impact.

The event study results show that individual stock returns in South Africa are significantly sensitive to GDP growth and CA surprises. Upon immediate impact, the GDP growth shocks cause negative stock returns indicating that initially investors do not like the surprise element in GDP growth surprise announcements. However, the BVAR analysis shows that post immediate impact, the individual stock returns increase and remain positive for at least five months. This finding is in line with widely hypothesised economic theory which asserts that a positive relationship exists between GDP growth and stock

returns. In order to benefit from this returns pattern, speculative traders can pick up cheaply priced stocks immediately after the GDP growth shocks and adopt a minimum five-month holding period strategy whilst waiting for the stocks to recover to their short-term peak levels reflected in the impulse response functions. According to the BVAR analysis, on average it takes approximately five months for the sample individual stock returns to recover and reach their twelve-month peak levels post a GDP growth shock.

In addition to GDP growth and CA surprises, the BVAR analysis indicates that USFed shocks have significant effects on individual stock returns in South Africa, especially since our study includes the extraordinary period of US quantitative easing following the 2008 financial crisis. Before investing in emerging and liquid stock markets such as South Africa, both local and foreign investors should always incorporate USFed interest rate forecasts into their valuation models in order to account for the adverse effects of reverse carry trade risk.

The study finds that individual banking stocks and resource stocks are significantly sensitive to REPO surprises but in opposite directions. Individual banking stocks benefit from increasing interest rates since high interest rate environments boost banking profitability, whilst capital intensive resource stocks prefer lower interest rate environments to reduce their cost to capital. These results have important implications for portfolio risk management or investors' diversification strategies. Since banking and resource stocks are uncorrelated when it comes to their response to REPO surprises, investors are encouraged to combine these stocks to form low-risk portfolios when faced with volatile interest rate cycles.

The sensitivity of banking and resource stocks to REPO surprises has important implications for policy makers in South Africa. According to StatsSA (2016), the financial and resource sectors are among the key sectors in South Africa. Together they make a significant contribution to GDP and keep the economic engine running strongly. Therefore, policy makers must be cognisant of how unexpected REPO announcements by the MPC impact on these important sectors, investor confidence and the economy as a whole.

Retail, property and consumer goods stocks are very responsive to GDP growth shocks. In uncertain economic environments, risk averse investors and portfolio managers are cautioned from holding a high concentration of retail, property and consumer goods stocks in the same single portfolio. Once combined, these individual stocks have the ability to increase overall portfolio (risk) volatility when faced with GDP growth shocks.

It is evident that a study focusing on macroeconomic surprises and movements in individual stock returns reveals opportunities for the investment community and adds value to policy making in South Africa.

Whilst this study covers a wide range of macroeconomic surprises that are pertinent to the current South African stock market, political risk and sovereign credit downgrade risk have risen in recent times and are becoming highly concerning, influencing the investment decisions of many local and foreign investors. For example, in December 2015 when President Jacob Zuma suddenly removed Minister of Finance, Nhlanhla Nene, and replaced him with a relatively unknown David van Rooyen, investor confidence was negatively affected. The banking index crashed by a record 19% in the two days following Nene's removal (Bloomberg, 2016). Similarly, in December 2015 Fitch Ratings Inc decided to downgrade South Africa to the lowest investment grade category (BBB–). Since then, there have been growing threats of a South African sovereign credit downgrade to junk status due to ongoing political and policy uncertainties, a high current account deficit and low economic growth. A credit downgrade would drive up borrowing costs, weaken the South Africa Rand (ZAR), lead to foreign investors leaving South Africa's capital markets and negatively impact JSE stock returns. Therefore, future studies should undertake a political risk analysis by incorporating appropriate dummy variables into the event study as proxies for political news surprises and sovereign credit downgrade surprises. This will help to examine the sensitivity of individual stock returns to unexpected political news announcements and unexpected sovereign credit downgrades in South Africa.

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APPENDIX A: COMPANY DESCRIPTION

A1. A brief company description for the twenty-four individual stocks included in the study sample sourced from Bloomberg (2016)

A1.1 Anglo American PLC (AGL)

Anglo American PLC is a mining company with global operations in Europe, Africa, Asia, North and South America, and Australia. Its portfolio includes bulk commodities such as manganese, iron ore, and metallurgical coal, base metals such as nickel, copper and precious metals and minerals include diamonds and platinum. Anglo American PLC is a UK-based company with significant stakes in global producers of diamonds (85% of De Beers S.A.) and platinum (75% of Anglo Platinum). Anglo American PLC also has interests in industrial minerals, ferrous and base metals. The company is one of the world's largest iron ore and copper producers. Anglo American PLC is one of the world's largest coal miners and exporters of metallurgical coal which is an important raw material in steel production. It produces thermal coal which is used to generate electricity. The company was founded by the Oppenheimer family, however they no longer have controlling interest in the company.

A1.2 Anglo American Platinum Ltd (AMS)

Anglo American Platinum Ltd (Amplats) is a holding company for a group of companies that operate platinum mines across the world. Not only does the Group operate platinum mines, but it also mines and produces palladium, rhodium, iridium, ruthenium, osmium, nickel, copper, and cobalt. Amplats is 80% held and owned by Anglo American PLC. Amplats has exploration projects in Brazil via joint-ventures, has operations in the Unki Mine (Zimbabwe), and is also involved in exploration activities in Russia.

A1.3 Barclays Africa Group Ltd (BGA)

Barclays Africa Group Ltd is the holding company of a banking and financial services group. The Group provides retail and corporate banking, insurance, financial and

property services through local and international networks. Barclays Africa Group Ltd serves an estimated 12 million consumers, commercial clients and small businesses. Absa Bank is one of the largest retail banks and mortgage lenders in South Africa, with approximately 700 branches and 9,000 ATMs. Absa Bank and other subsidiaries offer deposits, loans, credit cards, insurance, investments, financial planning, brokerage, wealth management, and investment banking services. British bank Barclays owns about 55% of Absa Group, making it one of South Africa's largest foreign investors since apartheid ended in 1994. Beyond South Africa, Absa Group owns some 80% of Barclays Bank Mozambique and a majority of National Bank of Commerce in Tanzania. The company, which also has representative offices in Namibia and Nigeria, is taking steps to broaden its presence in its existing markets and the surrounding region. It acquired Global Alliance Seguros, a Mozambique-based life and property/casualty insurer, in 2011. In 2011, Absa Group launched an insurance unit in Botswana.

A1.4 BHP Billiton PLC (BIL)

BHP Billiton Plc is an international resources company. The Company's principal business lines are mineral exploration and production, including coal, iron ore, gold, titanium, ferroalloys, nickel, and copper concentrate, as well as petroleum exploration and production. Dually-listed company with BHP AU. BHP Billiton Plc is one half of a dual-listed mining giant. It is headquartered in London; the other part of the company, BHP Billiton Limited, is based in Australia. Although they maintain separate listings, the companies are managed as a single entity and have the same management team and board of directors. One of the largest diversified natural resources companies, it ranks among the world's top producers of iron ore and coal (thermal and metallurgical). Other products include aluminum, copper, manganese, nickel, silver, uranium, and potash. BHP also has crude oil and natural gas holdings.

A1.5 Bidvest Group Ltd (BVT)

The Bidvest Group Limited is the holding company for a group of companies operating in a range of sectors. Subsidiaries manufacture and distribute food and allied products to the catering industry, as well as packaging, stapling, fastening and adhesive tapes, office products, cosmetics, toiletries and skin care products. Bidvest also provides laundering services. The Bidvest Group is a leading diversified holding company with interests in food products, freight services, manufacturing, and automobile sales. Its food service division distributes a range of products to customers in the restaurant and catering industries in Africa, Asia/Pacific, and Europe. Bidvest South Africa and Bidvest Namibia include logistics and freight management as well as car dealerships, travel agencies, and financial services in sub-Saharan Africa. Other units make and distribute industrial and commercial products and offer outsourced facilities management services. The decentralized company operates more than 30 offices in about 20 countries.

A1.6 Cie Financiere Richemont SA (CFR)

Compagnie Financiere Richemont SA, through subsidiaries, manufactures and retails luxury goods.The Company produces jewelry, watches, leather goods, writing instruments, and men's and women's wear. Richemont was created in 1988 by the spin-off of the international assets owned by Rembrandt Group Limited of South Africa (now known as Remgro Limited). Established by Dr Anton Rupert in the 1940s, Rembrandt Group owned significant interests in the tobacco, financial services, wines and spirits, gold and diamond mining industries as well as the luxury goods investments that, along with the investment in Rothmans International, would form Richemont. The Group's luxury interests encompass several of the most prestigious names in the luxury industry including Cartier, Van Cleef & Arpels, Piaget, Vacheron Constantin, Jaeger-LeCoultre, IWC Schaffhausen, Panerai and Montblanc. The geographical dispersion of Richemont is displayed in Figure 14.

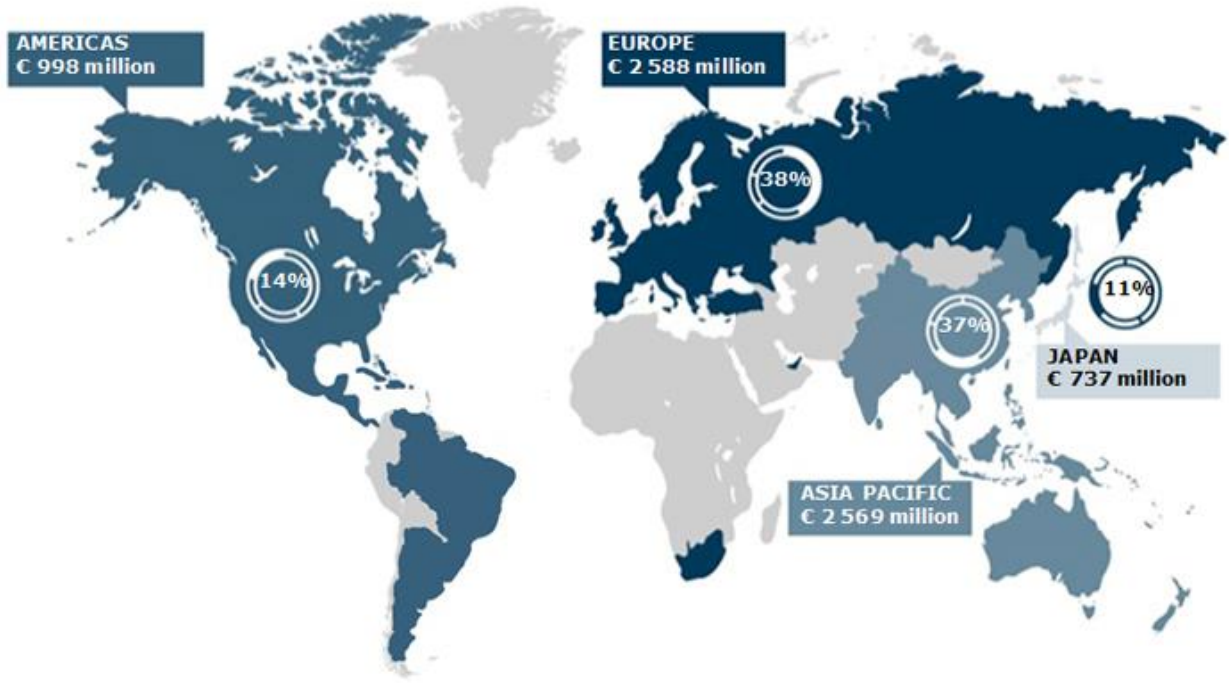

Figure 14: The geographical dispersion of Richemont across the world

Source: Richemont website (https://www.richemont.com/about-richemont/geographical-dispersion.html) on 10 March 2017

A1.7 FirstRand Ltd (FSR)

FirstRand Limited is a financial services group providing banking and insurance products and services to retail, commercial, corporate and public sector customers through its portfolio of separately branded franchises. In addition to South Africa, the Group operates in African territories. The company and its subsidiaries offer retail and private banking, corporate and investment banking, insurance, and asset management. The company's FirstRand Bank Holdings operates FirstRand Bank and First National Bank (FNB) in southern Africa, as well as asset financing firm WesBank and investment bank Rand Merchant Bank. FirstRand owns and operates around 870 FNB branches and more than 6,600 ATMs mostly in South Africa, but also Botswana, Lesotho, Mozambique, Namibia, Swaziland, and Zambia. It also has a presence in Asia, Australia, the Middle East, and the UK.

A1.8 Investec Ltd (INL)

Investec Limited is an international investment and private banking group. The Group provides corporate and investment banking, private banking, securities trading, asset management, property trading and management and trade finance services. INL is a dually-listed company together with INP. The company's Private Client Activities unit offers private banking, brokerage, and portfolio management. Its Investment Banking division focuses on corporate finance; institutional research, sales, and trading; and private equity investments. Investec also has divisions devoted to asset management, capital markets, and property investment. Investec expanded in the UK through the 2011 acquisition of investment bank and asset manager Evolution Group and the purchase of asset manager Rensburg Sheppards (now Investec Wealth & Investment) in 2010. Although the divisions that make up Investec operate as a unified whole, the group's non-domestic businesses were placed under UK-based Investec plc when the group gained permission to list on the London Stock Exchange in 2002. The company has traded on the Johannesburg Stock Exchange since 1986. Investec has operations in Australia, Botswana, Hong Kong, Ireland, Mauritius, Namibia, South Africa, Switzerland, and the UK.

A1.9 Investec PLC (INP)

Investec plc is an international specialist bank and asset manager. The Group provides corporate and investment banking, private banking, securities trading, asset management, property trading and management and trade finance services. INP is a dually-listed company together with INL. Investec PLC is the UK arm of Investec, a dual-listed financial services firm providing private banking, asset management, brokerage, and investment banking, primarily to wealthy clients and financial institutions. (Partner Investec Limited is based in South Africa.) The firm operates six main business divisions: Asset Management, Wealth and Investment, Property, Private Banking, Investment Banking, and Capital Markets. The firm makes half of its operating income through its various Specialty Banking services, while the rest comes from its Asset Management and Wealth & Investment services. Investec's top markets

are in the UK, South Africa, and Australia, but it also operates in Europe and in the Americas.

A1.10 Intu Properties PLC (ITU)

Intu Properties plc is a shopping center owner, developer, and manager. The Company through its subsidiaries owns and operates shopping centers in multiple countries. Formerly Capital Shopping Centres, Intu Properties is a leading UK owner, manager, and developer of shopping centers. The property investment company (similar to a real estate investment trust, or REIT) owns or partially owns more than 20 regional shopping centers in the UK totaling more than 20 million sq. ft. of leasable space. Major tenants include Marks & Spencer, Debenhams, and Topshop. The company formally changed its name to Intu Properties in early 2013 in an effort to rebrand and integrate its physical and online retail environments under a single name. Intu Properties owned 21 shopping centers spanning more than 21 million sq ft of retail spaced, valued at over 7 billion at the end of 2014. Its shopping centers attract 400 million customer visits per year.

A1.11 MTN Group Ltd (MTN)

MTN Group Limited provides a wide range of communication services. The Company's services include cellular network access and business solutions. MTN Group is a multinational telecommunications group, operating in countries in Africa and the Middle East. The continent's largest wireless network operator has almost 200 million subscribers across Africa and the Middle East, through a network of subsidiaries. MTN has operations in more than 20 countries and is the No. 1 or No. 2 operator in most of its markets. Eighty percent of its customers have prepaid, no-contract plans. MTN earns the bulk of its sales from airtime and subscription fees, but it generates about 20% of revenues from interconnect fees. The company partners with financial services companies to offer mobile banking services and money transfer services for clients without bank accounts.

A1.12 Nedbank Group Ltd (NED)

Nedbank Group Ltd is a bank holding company which provides personal, commercial, corporate and merchant banking, fund management and related financial services throughout South Africa. In addition, Nedbank operates internationally through offices in London, Isle of Man, and subsidiaries and associates in sub-Saharan Africa. Nedbank Group provides commercial and personal financial services in South Africa and other parts of the continent. The company offers a range of wholesale and retail banking services through principal business clusters Nedbank Corporate, Nedbank Retail, Nedbank Wealth, Nedbank Business Banking, and Nedbank Capital (investment banking and capital markets). Other services include property finance, private banking, credit card processing, insurance, and foreign exchange and securities trading.

UK-based insurer Old Mutual owns a controlling stake in Nedbank Group. Nedbank has approximately 500 retail and commercial banking branches primarily situated in South Africa's urban and suburban areas. The banking group has about 400 banking outlets inside retailer, Pick 'n Pay grocery stores and more than 40 other locations spread across southern Africa. To grow its retail business, Nedbank is currently looking to underserved markets such as youth, senior citizens, and small and medium-sized enterprises. The banking group is in the process of building and expanding its wealth management operations. As part of an effort to increase its motor vehicle and asset finance business, in 2010 the company acquired the nearly 49% of Imperial Bank that it did not already own. Nedbank strengthened its presence in Africa in 2008 when it announced a strategic alliance with Ecobank. Ecobank mainly has operations in west and central Africa. The deal was part of Nedbank Ltd’s overall strategy to expand its presence internationally and across Africa. As a direct consequence of the deal, Nedbank clients now enjoy access to both banking networks which cover in excess of 30 countries.

A1.13 Naspers Ltd (NPN)

Naspers Limited is a holding company for a group of companies which operate in the electronic and print media industries. The Group provides television subscription and

internet services and publishes newspapers, magazines and books. Africa just isn't a big enough continent to contain Naspers. The media company operates primarily in South Africa and sub-Saharan Africa, but also does business in Asia, Europe, and South America. Through several subsidiaries and ownership stakes in foreign companies, Naspers offers Internet content (e-commerce websites and classified ads), pay TV, and print publishing. Its largest stakes are in Russian email provider mail.ru and Chinese ISP Tencent. Its MultiChoice unit provides cable and satellite TV to more than 7 million households in about 50 countries across Africa, while its print media division publishes books, magazines, and newspapers.

A1.14 Netcare Ltd (NTC)

Netcare Limited is a South African health care company that owns and operates a number of private hospitals and clinics. It is an investment holding company which operates through a number of subsidiaries and employs just under 29 000 people. Netcare Limited is the largest private hospital network in South Africa and the United Kingdom (UK).

A1.15 Old Mutual PLC (OML)

Old Mutual plc is an international long-term savings, protection, and investment Group. The Company provides life assurance, asset management, banking, and general insurance to customers in Africa, the Americas, Asia, and Europe. Old Mutual provides banking, insurance, and asset management services in about 30 nations in southern Africa, Europe, Asia, and the Americas. Founded in 1845, Old Mutual owns a majority stake of South Africa's Nedbank Group, which provides commercial banking, finance, investment banking, and other services. It also owns Old Mutual (US) Holdings, also known as Old Mutual Asset Management (US), or OMAM (US). Skandia Insurance offers insurance products and mutual funds, primarily in the UK and Sweden. Old Mutual has some 262 billion (some $357 billion) in funds under management.

A1.16 Remgro Ltd (REM)

Remgro Ltd is an investment holding company that invests in banking and financial services, packaging, glass products, medical services, mining, petroleum, wine and spirits, food and home and personal care products. It holds investments, amongst others, in FirstRand Bank, RMB Holdings, Rainbow Chicken, Medi-Clinic Corp., Unilever South Africa, Tsb Sugar and Total South Africa. Remgro grows a variable garden of investments in South Africa. The holding company's interests lie mainly in banking and financial services, printing and packaging, motor components, glass products, medical services, mining, petroleum products, food, and alcoholic beverages. Remgro focuses on supporting its investments, rather than the day-to-day management of the businesses. Its holdings include Air Products SA, Tsb Sugar, and Rainbow Chicken. In 2008 Remgro “kicked its tobacco habit” and distributed to shareholders its entire interest in British American Tobacco (BAT, which once accounted for nearly half of Remgro's income). The company is controlled by chairman Johann Rupert through the Rembrandt Trust.

A1.17 RMB Holdings Ltd (RMH)

RMB Holdings Limited is an investment holding company. Through its equity investment in FirstRand Limited, the Company has activities which include life, group, pension and annuity assurance, merchant banking, asset and fund management, property management and other services.

A1.18 SABMiller PLC (SAB)

SABMiller plc is an international beer company. The Company bottles and distributes beer through breweries worldwide. SABMiller also bottles and distributes a number of soft drinks. They produce more than 150 international, national, and local beer brands spanning the globe. Big brands include Fosters and local favorites such as Castle Lager which is listed as the Number 1 beer in Africa. In Latin America, it owns Bavaria and Cervecera Nacional. Beyond brewing, SABMiller is one of the world's top bottlers of Coca-Cola products. In Quarter 4 of 2016, rival AB InBev acquired the company for $108 billion. To meet regulator requirements, AB InBev sold some of SABMiller's

biggest brands, including Grolsch, Peroni and Pilsener Urquell. SABMiller has offices and facilities in more than 80 countries including Latin America, North America, Europe, Asia/Pacific region, Africa, and South Africa.

A1.19 Standard Bank Group Ltd (SBK)

Standard Bank Group Limited is an African integrated financial services group offering a full range of banking and related financial services. The Bank provides services in transactional banking, saving, borrowing, lending, investment, insurance, risk management, wealth management, and advisory services. Standard Bank is South Africa's largest bank. The bank offers a number of services covering retail and commercial banking, corporate and investment banking, investment management, and life insurance in approximately 700 locations in South Africa. The group is widespread and includes another 500 additional branches in more than 15 other African nations, where it operates as Stanbic Bank. Outside of Africa, the bank has offices in Europe, Asia, and the Americas (including many emerging markets). Standard Bank serves individuals, business and corporate customers. Standard Bank holds a controlling stake in a South African insurance firm called Liberty Holdings.

A1.20 Sanlam Ltd (SLM)

Sanlam Ltd operates worldwide as a financial services group. The group provides financial solutions to institutional and individual clients. Sanlam's service offering includes insurance, financial planning, short term insurance, retirement, trust, wills, asset and wealth management, risk management, capital market activities, investment and wealth. Sanlam Ltd targets middle-market and affluent clients. Life insurance (including annuities and other investment products) and short-term insurance (property and casualty coverage sold through majority-owned Santam) are major segments within the group. The company has recently been focusing on expanding its investment business by including Sanlam Investment Management, its Octane hedge fund of funds, and its SIM Emerging Markets (which mainly focuses on African economies).

A1.21 Steinhoff International Holdings NV (SNH)

Steinhoff International Holdings NV is an integrated discount retailer. The company manufactures sources and retails furniture, household goods and clothing in Europe, the United States, Australasia and Africa. Steinhoff's operations are targeted towards mass-market and value-conscious consumer segments.

A1.22 Sasol Ltd (SOL)

Sasol Ltd is an integrated oil and gas company with substantial chemical interests. The company has production facilities situated in South Africa, Europe, North America and Asia. Sasol Ltd operates commercial scale facilities to produce fuels and chemicals from coal in South Africa, and is developing ventures internationally to convert natural gas into clean diesel fuel. Not only does Sasol Ltd make various petrochemicals, liquid and gaseous fuels, synthetic fuels, and lubricants, but they also operate coal mines in South Africa. The coal is used as feedstock for Sasol's synthetic fuels and chemicals plants. The company has operations in Europe, Asia and the Americas, however it generates in excess of 50% of its sales in South Africa. The exploration and production of oil and gas in western and southern Africa is undertaken by Sasol Petroleum International.

A1.23 Tiger Brands Ltd (TBS)

Tiger Brands Ltd manufactures, processes, and distributes food products. These include milling, baking, general foods, confectioneries, edible oils, and derivatives. Tiger Brands is a significant force in South Africa's consumer goods market. The company makes, distributes, and sells name brand packaged food and beverages, household products, and personal care products. Tiger Brands product offering comprises of cereals, condiments, confectionery, canned foods, snacks, pasta, processed meats, baked goods, juices, energy and fruit drinks. The company's home and personal care items range includes insecticides, cleaners, baby food and toiletries. A number of subsidiaries extend Tiger Brand's product range to neighboring African countries. As part of Tiger's export activities, subsidiaries such as Chococam

(Cameroon), Haco (Kenya), and others, offer Tiger's brand products to SA's neighbors.

A1.24 Woolworths Holdings Ltd SA (WHL)

Woolworths Holdings Ltd is a South African-based retail group which operates a chain of retail stores. These stores offer a selected range of high quality clothing, food, homeware, beauty and financial services under Woolworths brand name. The Company also owns a clothing and homeware retailer with stores in selected African countries, Australia, New Zealand and the Middle East. The Group consists of three main operating companies, namely Woolworths Proprietary Limited, David Jones Limited and Country Road Limited. Woolworths Financial Services (Pty) Limited is a joint venture with Barclays Africa Group.

APPENDIX B: RESULTS OF DURBIN-WATSON AND VIF TEST

Results of the Durbin-Watson (DW) Test

Table 7: DW Test results for all individual stocks

No	Ticker	Company Name	Durbin-Watson stat
1	AGL	Anglo American PLC	2.118929
2	AMS	Anglo American Platinum Ltd	1.799584
3	BGA	Barclays Africa Group Ltd	2.063846
4	BIL	BHP Billiton PLC	2.104398
5	BVT	Bidvest Group Ltd/The	2.103646
6	CFR	Cie Financiere Richemont SA	2.141134
7	FSR	FirstRand Ltd	2.065622
8	INL	Investec Ltd	2.047418
9	INP	Investec PLC	2.254643
10	ITU	Intu Properties PLC	2.112548
11	MTN	MTN Group Ltd	2.110222
12	NED	Nedbank Group Ltd	2.068045
13	NPN	Naspers Ltd	2.148043
14	NTC	Netcare Ltd	1.864157
15	OML	Old Mutual PLC	2.109404
16	REM	Remgro Ltd	1.906837
17	RMH	RMB Holdings Ltd	2.067257
18	SAB	SABMiller PLC	2.133639
19	SBK	Standard Bank Group Ltd	2.068088
20	SLM	Sanlam Ltd	2.106286
21	SNH	Steinhoff International Holdings NV	1.994412
22	SOL	Sasol Ltd	2.102342
23	TBS	Tiger Brands Ltd	2.177461
24	WHL	Woolworths Holdings Ltd/South Africa	2.023601

Results of the Variance Inflation Factors (VIF) Test

Table 8: VIF results for Woolworths Holdings Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.22E-05	1.991973	NA
DCA	0.000103	1.874513	1.814558
LOGOIL(-1)	0.019365	3.380033	2.844818
GDPSUP	0.031188	2.998388	2.990809
FEDSUP	0.299129	2.319632	2.313368
REPOSUP	0.255813	2.399946	2.284739
CPISUP	0.139865	2.878128	2.401973
RET_JSE	0.000121	3.479733	2.733830
AR(1)	0.005076	2.988631	2.781597
AR(2)	0.003673	2.857038	2.519518

Table 9: VIF results for Tiger Brands Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.11E-05	1.857362	NA
DCA	0.000119	1.481598	1.425783
LOGOIL(-1)	0.008692	1.290956	1.198763
GDPSUP	0.018021	1.453020	1.424731
FEDSUP	0.485195	2.333042	1.872456
REPOSUP	0.477436	5.108384	4.862020
CPISUP	0.206679	4.036080	3.800894
RET_JSE	9.84E-05	1.336913	1.336817
AR(1)	0.007417	3.481077	3.474973
AR(2)	0.004922	3.802836	3.651416

Table 10: VIF results for Steinhoff International Holdings

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.18E-05	2.381480	NA
DCA	0.000302	1.927882	1.927851
LOGOIL(-1)	0.035953	1.976540	1.923965
GDPSUP	0.047948	2.696636	2.646733
FEDSUP	0.303495	5.075723	5.064882
REPOSUP	0.436012	4.215466	4.171011
CPISUP	0.243367	3.161920	3.138752
RET_JSE	0.000183	2.802246	2.802165
AR(1)	0.007772	8.960619	5.705896
AR(2)	0.006008	6.303450	5.023014

Table 11: VIF results for Standard Bank Group Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.20E-05	2.426620	NA
DCA	0.000181	2.048533	1.967203
LOGOIL(-1)	0.052928	2.370224	2.260267
GDPSUP	0.038709	1.894776	1.894192
FEDSUP	0.238051	3.777350	2.387065
REPOSUP	0.736549	4.390448	2.553435
CPISUP	0.169805	2.190388	1.684830
RET_JSE	0.000237	3.193626	3.054355
AR(1)	0.006321	2.494526	2.342755
AR(2)	0.004943	2.766471	2.681128

Table 12: VIF results for Sasol Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.21E-05	1.756200	NA
DCA	9.50E-05	1.554428	1.530496
LOGOIL(-1)	0.025423	1.922646	1.909596
GDPSUP	0.039963	1.668807	1.634653
FEDSUP	0.454634	4.596776	4.391745
REPOSUP	0.630664	8.003342	6.991234
CPISUP	0.261782	4.689602	3.088016
RET_JSE	0.000115	1.856098	1.627709
AR(1)	0.005614	4.715894	4.298415
AR(2)	0.004195	4.894725	4.530611

Table 13: VIF results for Sanlam Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.21E-05	3.010153	NA
DCA	0.000100	1.809101	1.767506
LOGOIL(-1)	0.021102	3.874888	3.622111
GDPSUP	0.017092	2.090986	2.062414
FEDSUP	0.280584	3.967958	1.969204
REPOSUP	0.217523	4.852360	3.362007
CPISUP	0.125568	2.782078	2.464616
RET_JSE	0.000138	3.617919	3.276418
AR(1)	0.006510	6.848174	6.583800
AR(2)	0.004936	6.968664	6.656305

Table 14: VIF results for SABMiller PLC

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.05E-05	1.574851	NA
DCA	0.000161	1.944782	1.799634
LOGOIL(-1)	0.046567	6.629563	6.555173
GDPSUP	0.017960	1.909132	1.820797
FEDSUP	0.092286	2.607249	2.188626
REPOSUP	0.147012	2.855934	2.493666
CPISUP	0.124535	2.560054	2.460802
RET_JSE	0.000243	6.786482	6.783484
AR(1)	0.007898	4.885915	4.457863
AR(2)	0.005088	4.952740	4.413685

Table 15: VIF results for RMB Holdings Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.57E-05	1.970486	NA
DCA	0.000307	2.288769	2.288737
LOGOIL(-1)	0.054942	3.012819	3.011656
GDPSUP	0.061781	4.450011	4.343493
FEDSUP	0.168634	3.467137	2.878572
REPOSUP	0.441473	2.595168	1.936941
CPISUP	0.179581	2.196222	1.378049
RET_JSE	0.000289	3.528523	3.511329
AR(1)	0.008313	4.257079	3.949816
AR(2)	0.004290	3.682424	3.522605

Table 16: VIF results for Remgro Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	7.66E-06	1.153502	NA
DCA	6.69E-05	1.436249	1.432042
LOGOIL(-1)	0.005688	1.393596	1.393563
GDPSUP	0.010693	1.540304	1.536981
FEDSUP	0.411052	2.016449	1.994286
REPOSUP	0.169783	3.430971	3.430843
CPISUP	0.063491	2.102639	2.081690
RET_JSE	3.90E-05	2.143370	2.094671
AR(1)	0.004014	5.267016	5.102945
AR(2)	0.003900	5.355200	5.001129

Table 17: VIF results for Old Mutual PLC

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.17E-05	2.417896	NA
DCA	0.000388	1.433355	1.331369
LOGOIL(-1)	0.047258	4.057776	3.707169
GDPSUP	0.036300	2.980632	2.766205
FEDSUP	0.537866	2.580098	1.637861
REPOSUP	1.066244	4.145987	2.674945
CPISUP	0.193137	2.846162	2.755998
RET_JSE	0.000298	6.279128	5.048388
AR(1)	0.004840	4.300184	3.611275
AR(2)	0.004036	3.985947	3.616253

Table 18: VIF results for Netcare Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	9.84E-06	1.993723	NA
DCA	3.46E-05	1.583804	1.417013
LOGOIL(-1)	0.017561	3.001474	2.758910
GDPSUP	0.023209	2.284051	2.249507
FEDSUP	0.306455	3.426456	3.134451
REPOSUP	0.146307	2.484868	2.482897
CPISUP	0.100023	3.237937	2.942926
RET_JSE	9.68E-05	2.884376	2.851161
AR(1)	0.005832	2.665930	2.564101
AR(2)	0.003180	3.527676	3.431457

Table 19: VIF results for Nedbank Group Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.10E-05	2.832706	NA
DCA	0.000162	1.969405	1.931613
LOGOIL(-1)	0.065853	4.996758	4.653091
GDPSUP	0.032228	1.286733	1.221753
FEDSUP	0.379100	2.723529	1.890161
REPOSUP	0.317002	2.581842	2.315552
CPISUP	0.177312	2.412011	2.312971
RET_JSE	0.000294	5.088954	4.883306
AR(1)	0.008778	8.315030	8.084905
AR(2)	0.007400	8.133308	6.868684

Table 20: VIF results for MTN Group Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.03E-05	1.877222	NA
DCA	0.000108	2.831502	2.779711
LOGOIL(-1)	0.008668	1.790786	1.715792
GDPSUP	0.016191	2.240947	2.181115
FEDSUP	0.229812	2.706088	2.299290
REPOSUP	0.202526	3.476422	2.716302
CPISUP	0.055666	2.519798	2.500720
RET_JSE	4.53E-05	2.427102	2.108745
AR(1)	0.006596	8.24122	8.07407
AR(2)	0.004697	5.55912	5.45300

Table 21: VIF results for Naspers Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.29E-05	1.195626	NA
DCA	0.000128	1.408046	1.407660
LOGOIL(-1)	0.019400	2.834294	2.618898
GDPSUP	0.023004	1.634463	1.631115
FEDSUP	0.215029	2.193070	2.190105
REPOSUP	0.281975	3.234561	3.146109
CPISUP	0.184828	3.712827	3.584355
RET_JSE	0.000170	2.546792	2.444865
AR(1)	0.007491	8.128942	7.534166
AR(2)	0.004976	6.549073	6.163811

Table 22: VIF results for Investec PLC

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	8.30E-06	1.480689	NA
DCA	0.000300	2.235411	2.162936
LOGOIL(-1)	0.054009	3.029072	2.806954
GDPSUP	0.066702	2.603433	2.599787
FEDSUP	0.543906	1.707967	1.674506
REPOSUP	1.158338	3.032672	2.975805
CPISUP	0.582738	5.118090	4.622993
RET_JSE	0.000311	3.222689	3.200162
AR(1)	0.006760	3.621088	3.478289
AR(2)	0.006605	6.262300	5.971856

Table 23: VIF results for Investec Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.45E-05	1.411580	NA
DCA	0.000269	1.464078	1.462125
LOGOIL(-1)	0.074637	4.338276	4.173047
GDPSUP	0.047832	1.727662	1.706130
FEDSUP	0.389299	1.948408	1.942259
REPOSUP	0.529460	3.035987	2.777762
CPISUP	0.352673	2.895333	2.346286
RET_JSE	0.000444	3.454494	3.317102
AR(1)	0.007207	2.617541	2.492220
AR(2)	0.004357	2.868369	2.581815

Table 24: VIF results for Intu Properties PLC

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.97E-05	2.080329	NA
DCA	0.000144	1.576540	1.562034
LOGOIL(-1)	0.040091	3.362862	3.361841
GDPSUP	0.028772	2.224908	2.145631
FEDSUP	1.019359	2.277579	1.578765
REPOSUP	0.945875	2.779529	1.820342
CPISUP	0.202798	1.842514	1.783786
RET_JSE	0.000221	4.526453	4.498369
AR(1)	0.005857	6.629895	6.626621
AR(2)	0.004284	7.395030	7.334915

Table 25: VIF results for FirstRand Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.72E-05	1.681923	NA
DCA	0.000157	1.701991	1.701987
LOGOIL(-1)	0.034022	2.153522	2.141442
GDPSUP	0.034978	2.255146	2.210736
FEDSUP	0.167224	2.805340	2.178384
REPOSUP	0.447420	2.812433	2.162900
CPISUP	0.128251	2.192304	1.881574
RET_JSE	0.000195	2.661661	2.650469
AR(1)	0.006675	2.384876	2.364217
AR(2)	0.003721	2.448224	2.429984

Table 26: VIF results for Richemont

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.99E-05	1.652963	NA
DCA	0.000235	1.575820	1.543447
LOGOIL(-1)	0.052631	2.559860	2.395464
GDPSUP	0.036793	1.560288	1.523877
FEDSUP	0.655787	1.751330	1.365740
REPOSUP	0.739979	1.760104	1.703639
CPISUP	0.205983	2.010987	1.949093
RET_JSE	0.000286	3.576762	3.440203
AR(1)	0.008429	4.332265	4.321057
AR(2)	0.003600	5.165092	5.145329

Table 27: VIF results for Bidvest Group Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.57E-05	1.871563	NA
DCA	0.000269	1.871202	1.870672
LOGOIL(-1)	0.021595	2.190049	2.181354
GDPSUP	0.028620	1.855297	1.851367
FEDSUP	0.278635	2.905556	2.367698
REPOSUP	0.549358	3.467303	2.892121
CPISUP	0.199823	2.148472	2.079569
RET_JSE	0.000211	2.364069	2.363999
AR(1)	0.005877	4.042194	3.905735
AR(2)	0.003400	3.741885	3.258484

Table 28: VIF results for BHP Billiton PLC

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	8.59E-06	1.079293	NA
DCA	0.000176	1.234923	1.231363
LOGOIL(-1)	0.066203	1.265028	1.264404
GDPSUP	0.025796	1.262635	1.260419
REPOSUP	0.674486	1.348139	1.347222
CPISUP	0.356861	1.294568	1.294564
FEDSUP	0.368758	1.138461	1.064506
RET_JSE	0.000356	1.286522	1.283118
AR(1)	0.007259	2.000659	2.000524
AR(2)	0.007064	1.956251	1.956183

Table 29: VIF results for Barclays Africa Group Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.21E-05	2.345362	NA
DCA	0.000208	2.078273	2.019405
LOGOIL(-1)	0.075222	4.869448	4.232470
GDPSUP	0.054392	2.002826	1.854617
FEDSUP	0.446605	2.565771	1.994560
REPOSUP	0.497293	2.924011	2.355738
CPISUP	0.230498	2.059177	1.779998
RET_JSE	0.000386	6.867997	5.888425
AR(1)	0.009814	5.582531	5.375425
AR(2)	0.006681	3.883987	3.621980

Table 30: VIF results for Anglo American PLC

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.41E-05	1.454181	NA
DCA	0.000201	1.808235	1.689811
LOGOIL(-1)	0.021531	2.118025	2.071090
GDPSUP	0.020707	1.984678	1.857955
FEDSUP	1.609455	1.282464	1.213295
REPOSUP	1.204644	2.897488	2.436128
CPISUP	0.273668	2.373585	2.366319
RET_JSE	0.000379	1.964924	1.964156
AR(1)	0.006389	5.144126	5.016288
AR(2)	0.008040	7.707352	7.145778

Table 31: VIF results for Anglo American Platinum Ltd

Variance Inflation Factors
Sample: 2005M01 2015M12
Included observations: 115

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	3.96E-05	3.677366	NA
DCA	0.000108	2.099882	2.058732
LOGOIL(-1)	0.055007	4.049613	4.034926
GDPSUP	0.035304	2.785013	2.602951
FEDSUP	0.916828	8.649183	3.532145
REPOSUP	0.271218	3.773159	3.057401
CPISUP	0.132197	7.089401	3.781338
RET_JSE	0.000258	6.340428	5.808907
AR(1)	0.007490	7.429090	6.637556
AR(2)	0.006261	7.168093	6.227484

APPENDIX C: RESULTS OF THE ROBUSTNESS TEST

Table 32: Event study results (including RmSup)

Log returns of each stock	C	RmSup	GDP	CPI	CA	REPO	USFed	OIL	R^2	R^2 (adj)
Anglo American PLC	0.00	-0.01	-0.52 ***	0.12	0.06 ***	-0.40	4.98 ***	-0.30	0.81	0.80
Anglo American Platinum Ltd	0.00	-0.02	-0.74 ***	-1.53 ***	0.02 *	-2.35 ***	0.77	-0.23	0.84	0.83
Barclays Africa Group Ltd	0.00	0.00	-0.78 ***	-1.27 ***	0.06 ***	1.18 *	1.84 ***	-0.14	0.81	0.79
BHP Billiton PLC	0.00	0.01	0.09	-0.29	0.01	-2.55 ***	-0.94	0.04	0.64	0.61
Bidvest Group Ltd/The	0.00	0.00	-0.82 ***	-0.13	0.05 ***	1.67 ***	-0.67	-0.24	0.79	0.78
Cie Financiere Richemont SA	0.00	0.00	-0.53 ***	-0.36	0.07 ***	0.32	0.50	-0.07	0.79	0.77
FirstRand Ltd	0.00	-0.01	-0.19 ***	0.13	0.02 **	0.98 *	0.42	-0.19	0.81	0.80
Investec Ltd	0.00	0.00	-0.50 ***	-0.49	0.04 ***	2.02 ***	2.80 ***	-0.33 *	0.80	0.78
Investec PLC	0.00	-0.01	0.00	2.25 ***	0.01	0.87	-4.68 ***	-0.03	0.77	0.75
Intu Properties PLC	0.00	-0.02	-0.25 *	-0.47	0.05 ***	-0.12	0.46	-0.16	0.81	0.80
MTN Group Ltd	0.00	0.00	-0.77 ***	-0.70 ***	0.04 ***	-0.18	0.07	0.04	0.89	0.89
Nedbank Group Ltd	0.01	0.01	-0.62 ***	-1.02 *	0.01	0.80	1.03 **	-0.27 *	0.84	0.82
Naspers Ltd	0.00	0.00	-0.86 ***	-0.32	0.02 ***	0.82 *	0.63	-0.15	0.87	0.86
Netcare Ltd	0.00	0.00	-0.23 **	0.50	-0.01	1.80 ***	0.73 *	0.06	0.78	0.76
Old Mutual PLC	0.01 **	0.00	-0.38 ***	-0.42	0.07 ***	0.53	-0.39	0.03	0.79	0.77
Remgro Ltd	0.00	0.00	-0.44 ***	-0.22	0.01 ***	1.27 ***	1.65 ***	-0.04	0.87	0.86
RMB Holdings Ltd	0.00	-0.01	-0.31 **	-0.40	0.03 ***	1.18 **	-0.76	-0.20	0.82	0.81
SABMiller PLC	0.01 ***	0.00	-0.23 **	-0.76 **	0.03 ***	-0.06	1.58 ***	-0.06	0.81	0.79
Standard Bank Group Ltd	0.00	-0.01	-0.52 ***	-0.58	0.02 **	1.80 ***	1.28 ***	-0.17	0.81	0.79
Sanlam Ltd	0.00	0.00	-0.51 ***	-0.25	0.03 ***	0.19	1.00 ***	-0.13	0.82	0.80
Steinhoff International Holdings	0.01	-0.01	-0.66 ***	-0.14	0.04 ***	2.27 ***	1.38 **	-0.11	0.85	0.84
Sasol Ltd	0.01	-0.01	-0.26 **	-0.38	0.04 ***	0.62	2.07 ***	0.01	0.78	0.76
Tiger Brands Ltd	0.00	0.00	-0.34 ***	0.24	0.01	-0.65	0.56	0.04	0.81	0.79
Woolworths Holdings Ltd	0.00	0.01	-0.65 ***	-0.42	0.03 ***	2.12 ***	1.10	-0.09	0.85	0.84

Note: The coefficients are significant at: ***1%, **5% and *10% significance levels and have been rounded off to two decimal places

Table 33: Event study results (excluding Rm and RmSup)

Log returns of each stock	C	GDP	CPI	CA	REPO	USFed	OIL	R^2	R^2 (adj)
Anglo American PLC	0.00	-0.51 ***	0.15	0.06 ***	-0.38	5.04 ***	-0.26	0.81	0.80
Anglo American Platinum Ltd	0.00	-0.76 ***	-1.42 ***	0.02	-2.31 ***	0.78	-0.22	0.84	0.83
Barclays Africa Group Ltd	0.00	-0.78 ***	-1.24 ***	0.06	1.18 *	1.85 ***	-0.13	0.81	0.80
BHP Billiton PLC	0.00	0.11	-0.41	0.01	-2.57 ***	-0.96	-0.01	0.64	0.62
Bidvest Group Ltd/The	0.00	-0.82 ***	-0.11	0.05 ***	1.69 ***	-0.67	-0.26	0.79	0.78
Cie Financiere Richemont SA	0.00	-0.53 ***	-0.34	0.07 ***	0.33	0.50	-0.07	0.79	0.78
FirstRand Ltd	0.00	-0.41 ***	0.22	0.02 **	1.00 **	0.41	-0.17	0.81	0.80
Investec Ltd	0.00	-0.50 ***	-0.47	0.04 ***	2.03 ***	2.81 ***	-0.34	0.80	0.78
Investec PLC	0.00	0.01	2.28 ***	0.01	0.92	-4.75 ***	-0.08	0.77	0.75
Intu Properties PLC	0.00	-0.24 *	-0.37	0.05 ***	-0.06	0.47	-0.19	0.81	0.80
MTN Group Ltd	0.00	-0.77 ***	-0.70 ***	0.04 ***	-0.17	0.07	0.03	0.89	0.89
Nedbank Group Ltd	0.01	-0.63 ***	-1.05 ***	0.01	0.77	1.02 **	-0.24	0.84	0.82
Naspers Ltd	0.00	-0.85 ***	-0.33	0.02 ***	0.82 *	0.63	-0.16	0.87	0.86
Netcare Ltd	0.00	-0.22 **	0.48	-0.01	1.80 ***	0.73 *	0.05	0.78	0.76
Old Mutual PLC	0.01 **	-0.36 **	-0.44	0.07 ***	0.56	-0.38	-0.01	0.79	0.77
Remgro Ltd	0.00	-0.45 ***	-0.23	0.02 ***	1.25 ***	1.65 ***	-0.02	0.87	0.86
RMB Holdings Ltd	0.00	-0.32 **	-0.31	0.03 ***	1.20 **	-0.76	-0.19	0.82	0.81
SABMiller PLC	0.01 ***	-0.23	-0.75	0.03 ***	-0.04	1.59 ***	-0.08	0.81	0.79
Standard Bank Group Ltd	0.00	-0.53 ***	-0.49	0.03 ***	1.82 ***	1.28 **	-0.16	0.81	0.79
Sanlam Ltd	0.00	-0.50 ***	-0.23	0.03 ***	0.21	1.01 ***	-0.15	0.82	0.80
Steinhoff International Holdings	0.01 *	-0.67 ***	-0.04	0.04 ***	2.30 ***	1.41 ***	-0.11	0.85	0.84
Sasol Ltd	0.01	-0.26	-0.33	0.04 ***	0.64	2.08 ***	0.01	0.78	0.76
Tiger Brands Ltd	0.00	-0.34 ***	0.26	0.01	-0.65	0.56	0.04	0.81	0.80
Woolworths Holdings Ltd	0.00	-0.65 ***	-0.46	0.03 ***	2.09	1.10 **	-0.07	0.85	0.84

Note: The coefficients are significant at: ***1%, **5% and *10% significance levels and have been rounded off to two decimal places

Table 34: Event study results using the simple traditional "surprise" definition

Log returns of each stock	C	Rm	GDP	CPI	CA	REPO	USFed	OIL	R^2	R^2 (adj)
Anglo American PLC	0.00	-0.01	0.44	-3.96	0.00	-1.11	-17.56	0.04	0.69	0.66
Anglo American Platinum Ltd	0.00	0.02	2.51	-1.35	0.00	-5.81	-18.22	-0.28	0.73	0.71
Barclays Africa Group Ltd	0.00	-0.01	1.55	-4.27	0.00	-2.10	-8.33	-0.18	0.68	0.66
BHP Billiton PLC	0.00	0.05 **	-0.54	1.65	0.00	-2.37	-19.77	0.26	0.63	0.60
Bidvest Group Ltd/The	0.00	0.00	3.18	1.02	0.00	-3.19	15.35	-0.28	0.71	0.69
Cie Financiere Richemont SA	0.00	0.01	4.52 *	7.12	0.00 ***	-4.81	-18.73	0.00	0.74	0.72
FirstRand Ltd	0.00	-0.01	5.58 ***	-0.23	0.00	-4.50 *	5.35	-0.24 *	0.80	0.79
Investec Ltd	0.00	-0.01	1.22	-3.05	0.00	-2.77	-9.93	-0.37	0.68	0.66
Investec PLC	0.00	0.00	4.25	-3.35	0.00	-0.25	-6.55	0.10	0.62	0.60
Intu Properties PLC	0.00	0.01	2.82	5.15	0.00	-3.67	-20.01	-0.13	0.78	0.77
MTN Group Ltd	0.00	0.02	1.97	0.36	0.00	-4.42	-8.04	0.05	0.81	0.79
Nedbank Group Ltd	0.00	-0.01	2.73	-0.49	0.00	-2.71	10.43	-0.35 *	0.75	0.73
Naspers Ltd	0.00	0.00	4.02 *	2.45	0.00	-2.15	-3.65	-0.25	0.78	0.77
Netcare Ltd	0.00	-0.03	3.74 **	1.95	0.00	0.27	-3.94	-0.15	0.75	0.73
Old Mutual PLC	0.01	-0.03 *	2.17	-2.42	0.00	0.34	-7.96	-0.14	0.73	0.71
Remgro Ltd	0.00	0.00	0.71	-3.07	0.00	-2.96	7.05	-0.03	0.74	0.72
RMB Holdings Ltd	0.00	0.00	4.11 *	-0.14	0.00	-4.29	-0.89	-0.16	0.82	0.80
SABMiller PLC	0.01 **	0.00	-0.10	-5.62	0.00	-6.44 **	-7.32	-0.10	0.76	0.74
Standard Bank Group Ltd	0.00	-0.01	2.79	-1.83	0.00	-3.25	6.00	-0.18	0.72	0.70
Sanlam Ltd	0.00	0.00	1.67	1.27	0.00	-2.23	5.91	-0.22	0.73	0.71
Steinhoff International Holdings	0.00	-0.02	2.20	-2.58	0.00	-2.94	2.85	-0.20	0.74	0.72
Sasol Ltd	0.00	0.01	1.26	3.14	0.00 *	-5.97	-24.73	0.04	0.68	0.66
Tiger Brands Ltd	0.00	0.01	4.18 **	7.76	0.00 **	-3.21	-5.41	-0.10	0.78	0.76
Woolworths Holdings Ltd	0.00	-0.01	0.85	-0.33	0.00 ***	0.97	-3.58	-0.11	0.74	0.72

Note: The coefficients are significant at: ***1%, **5% and *10% significance levels and have been rounded off to two decimal places

APPENDIX D: BVAR ESTIMATES TABLES

Table 35: BVAR estimates – Anglo American Platinum Ltd

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETAGLO_AMERIPLAT	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETAGLO_AMERIPLAT(-1)	0.641012	0.015407	0.010817	0.020773	-0.010840	0.007902	0.013756	-0.054604
	(0.05286)	(0.43128)	(0.01669)	(0.03593)	(0.00796)	(0.00644)	(0.00870)	(0.18237)
	[12.1277]	[0.03572]	[0.64823]	[0.57821]	[-1.36262]	[1.22714]	[1.58035]	[-0.29940]
RETAGLO_AMERIPLAT(-2)	-0.037347	0.173849	0.011296	0.058827	-0.007940	0.002314	0.005468	0.053196
	(0.04195)	(0.34122)	(0.01320)	(0.02842)	(0.00629)	(0.00509)	(0.00689)	(0.14429)
	[-0.89020]	[0.50949]	[0.85557]	[2.06957]	[-1.26155]	[0.45415]	[0.79396]	[0.36867]
DCA(-1)	-0.002365	0.568320	-0.000607	0.004492	0.000429	-0.000995	-0.001010	0.003052
	(0.00674)	(0.05550)	(0.00214)	(0.00460)	(0.00102)	(0.00083)	(0.00112)	(0.02337)
	[-0.35074]	[10.2402]	[-0.28401]	[0.97573]	[0.42056]	[-1.20575]	[-0.90565]	[0.13061]
DCA(-2)	0.000955	-0.058972	-6.58E-06	-0.002446	0.000369	-0.000185	-0.000711	0.009102
	(0.00504)	(0.04163)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01747)
	[0.18952]	[-1.41671]	[-0.00412]	[-0.71083]	[0.48388]	[-0.29948]	[-0.85283]	[0.52100]
LOGOIL(-1)	-0.160548	0.835815	0.094545	0.143326	0.021423	0.055232	0.011808	0.158966
	(0.22465)	(1.84135)	(0.07162)	(0.15338)	(0.03397)	(0.02749)	(0.03717)	(0.77894)
	[-0.71466]	[0.45391]	[1.32009]	[0.93446]	[0.63070]	[2.00891]	[0.31771]	[0.20408]
LOGOIL(-2)	0.066497	-0.079857	0.029811	0.002234	0.023472	0.014968	-0.002838	0.275406
	(0.13947)	(1.14322)	(0.04459)	(0.09523)	(0.02109)	(0.01707)	(0.02307)	(0.48347)
	[0.47677]	[-0.06985]	[0.66854]	[0.02346]	[1.11306]	[0.87686]	[-0.12299]	[0.56964]
GDPSUP(-1)	0.030548	-0.131396	0.011048	0.574986	0.009143	0.014204	-0.014171	-0.046747
	(0.08119)	(0.66547)	(0.02575)	(0.05567)	(0.01227)	(0.00994)	(0.01343)	(0.28139)
	[0.37625]	[-0.19745]	[0.42912]	[10.3281]	[0.74488]	[1.42963]	[-1.05519]	[-0.16613]
GDPSUP(-2)	0.140877	-0.895095	-0.007404	-0.058450	0.010752	0.002053	-0.002117	-0.002178
	(0.06079)	(0.49827)	(0.01928)	(0.04182)	(0.00919)	(0.00744)	(0.01006)	(0.21069)
	[2.31742]	[-1.79640]	[-0.38409]	[-1.39769]	[1.16993]	[0.27601]	[-0.21050]	[-0.01034]
FEDSUP(-1)	-0.031464	1.577492	-0.082091	0.193779	0.697792	0.022537	-0.057570	0.090290
	(0.32991)	(2.70405)	(0.10463)	(0.22524)	(0.05011)	(0.04038)	(0.05457)	(1.14352)
	[-0.09537]	[0.58338]	[-0.78461]	[0.86032]	[13.9244]	[0.55819]	[-1.05493]	[0.07896]
FEDSUP(-2)	0.076106	0.253248	-0.096169	0.178933	-0.028738	-0.002154	-0.011618	-0.789968
	(0.26681)	(2.18693)	(0.08462)	(0.18217)	(0.04064)	(0.03265)	(0.04414)	(0.92480)
	[0.28525]	[0.11580]	[-1.13648]	[0.98224]	[-0.70708]	[-0.06598]	[-0.26322]	[-0.85421]

REPOSUP(-1)	-0.541737	-2.760938	-0.077693	0.282484	0.093702	0.419130	-0.034245	1.441534
	(0.50789)	(4.16280)	(0.16107)	(0.34675)	(0.07679)	(0.06244)	(0.08402)	(1.76030)
	[-1.06664]	[-0.66324]	[-0.48236]	[0.81467]	[1.22028]	[6.71222]	[-0.40760]	[0.81892]
REPOSUP(-2)	0.126140	-2.117923	-0.127373	-0.083214	-0.026137	0.066876	-0.011377	-1.491231
	(0.35054)	(2.87323)	(0.11117)	(0.23933)	(0.05300)	(0.04324)	(0.05799)	(1.21503)
	[0.35985]	[-0.73712]	[-1.14572]	[-0.34770]	[-0.49316]	[1.54661]	[-0.19620]	[-1.22732]
CPISUP(-1)	-0.412864	5.473067	0.176574	0.077976	0.038557	0.034882	0.261386	-0.906615
	(0.41100)	(3.36881)	(0.13034)	(0.28058)	(0.06213)	(0.05030)	(0.06832)	(1.42443)
	[-1.00454]	[1.62463]	[1.35468]	[0.27790]	[0.62054]	[0.69353]	[3.82608]	[-0.63648]
CPISUP(-2)	-0.124715	1.312377	0.030510	-0.016517	0.028001	0.033372	0.012482	-0.236793
	(0.26527)	(2.17436)	(0.08413)	(0.18111)	(0.04011)	(0.03246)	(0.04424)	(0.91947)
	[-0.47014]	[0.60357]	[0.36264]	[-0.09120]	[0.69815]	[1.02793]	[0.28216]	[-0.25753]
RET_JSE(-1)	0.010805	0.034759	0.005518	0.018148	0.004621	-0.000614	0.004204	-0.042198
	(0.02044)	(0.16756)	(0.00649)	(0.01396)	(0.00309)	(0.00250)	(0.00338)	(0.07122)
	[0.52853]	[0.20744]	[0.85082]	[1.30029]	[1.49500]	[-0.24557]	[1.24328]	[-0.59249]
RET_JSE(-2)	0.013208	-0.046826	0.005027	0.005123	0.000874	-9.60E-05	0.000427	0.027194
	(0.01278)	(0.10479)	(0.00405)	(0.00873)	(0.00193)	(0.00156)	(0.00211)	(0.04467)
	[1.03316]	[-0.44686]	[1.23968]	[0.58691]	[0.45210]	[-0.06136]	[0.20206]	[0.60877]
C	-0.000679	-0.004568	-0.000535	-1.88E-05	-0.000472	8.33E-06	-0.000127	0.007262
	(0.00134)	(0.01098)	(0.00042)	(0.00091)	(0.00020)	(0.00016)	(0.00022)	(0.00464)
	[-0.50731]	[-0.41619]	[-1.26037]	[-0.02054]	[-2.33263]	[0.05085]	[-0.57156]	[1.56436]
R-squared	0.640063	0.562718	0.241293	0.601002	0.734901	0.540483	0.334906	0.073977
Adj. R-squared	0.581298	0.491325	0.117423	0.535860	0.691620	0.465460	0.226319	-0.077210
Sum sq. resids	0.026117	1.774614	0.001789	0.011790	0.000593	0.000285	0.000509	0.237501
S.E. equation	0.016325	0.134567	0.004272	0.010969	0.002461	0.001704	0.002280	0.049229
F-statistic	10.89186	7.881971	1.947949	9.225960	16.97959	7.204218	3.084222	0.489310
Mean dependent	-0.001190	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.025229	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 36: BVAR estimates – Anglo American PLC

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETAGLO_AMERIPLC	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETAGLO_AMERIPLC(-1)	0.597409	0.402296	-0.007178	-0.028529	0.003167	-0.000302	-0.012694	-0.180826
	(0.05489)	(0.35941)	(0.01391)	(0.02994)	(0.00663)	(0.00537)	(0.00725)	(0.15198)
	[10.8830]	[1.11931]	[-0.51617]	[-0.95295]	[0.47761]	[-0.05624]	[-1.75003]	[-1.18982]

RETAGLO_AMERIPLC(-2)	-0.064421	-0.000374	-0.005906	-0.002287	-0.007161	-0.001540	0.000560	-0.109596
	(0.04149)	(0.27073)	(0.01048)	(0.02255)	(0.00499)	(0.00404)	(0.00546)	(0.11449)
	[-1.55283]	[-0.00138]	[-0.56384]	[-0.10141]	[-1.43376]	[-0.38095]	[0.10249]	[-0.95730]
DCA(-1)	0.001505	0.556673	-0.000464	0.004803	0.000633	-0.001047	-0.000851	0.010277
	(0.00849)	(0.05607)	(0.00216)	(0.00465)	(0.00103)	(0.00083)	(0.00113)	(0.02361)
	[0.17726]	[9.92821]	[-0.21485]	[1.03260]	[0.61472]	[-1.25635]	[-0.75501]	[0.43531]
DCA(-2)	-0.003791	-0.058428	-5.25E-05	-0.002744	0.000458	-0.000199	-0.000790	0.009063
	(0.00629)	(0.04166)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01749)
	[-0.60268]	[-1.40240]	[-0.03280]	[-0.79675]	[0.60028]	[-0.32177]	[-0.94691]	[0.51832]
LOGOIL(-1)	-0.088454	0.967027	0.099282	0.162027	0.014963	0.058235	0.015727	0.106668
	(0.27956)	(1.83796)	(0.07149)	(0.15310)	(0.03390)	(0.02744)	(0.03710)	(0.77750)
	[-0.31640]	[0.52614]	[1.38882]	[1.05835]	[0.44135]	[2.12207]	[0.42393]	[0.13719]
LOGOIL(-2)	0.019338	-0.053845	0.029569	0.003807	0.022601	0.014939	-0.003055	0.261156
	(0.17390)	(1.14330)	(0.04459)	(0.09523)	(0.02109)	(0.01707)	(0.02307)	(0.48350)
	[0.11120]	[-0.04710]	[0.66307]	[0.03998]	[1.07167]	[0.87511]	[-0.13238]	[0.54013]
GDPSUP(-1)	0.123607	-0.032468	0.008132	0.571812	0.009196	0.012989	-0.018058	-0.090912
	(0.10099)	(0.66398)	(0.02569)	(0.05554)	(0.01225)	(0.00991)	(0.01340)	(0.28075)
	[1.22401]	[-0.04890]	[0.31658]	[10.2949]	[0.75089]	[1.31026]	[-1.34775]	[-0.32382]
GDPSUP(-2)	0.109387	-0.943130	-0.007226	-0.059743	0.010121	0.002386	-0.000510	0.000385
	(0.07557)	(0.49683)	(0.01922)	(0.04169)	(0.00916)	(0.00742)	(0.01003)	(0.21008)
	[1.44757]	[-1.89830]	[-0.37595]	[-1.43287]	[1.10440]	[0.32170]	[-0.05083]	[0.00183]
FEDSUP(-1)	0.182672	0.790092	-0.081927	0.182288	0.705614	0.019019	-0.046893	0.384755
	(0.41752)	(2.74461)	(0.10619)	(0.22862)	(0.05087)	(0.04098)	(0.05539)	(1.16068)
	[0.43752]	[0.28787]	[-0.77148]	[0.79735]	[13.8703]	[0.46409]	[-0.84657]	[0.33149]
FEDSUP(-2)	-0.898041	0.572051	-0.089630	0.191328	-0.028720	0.001729	-0.013717	-0.831359
	(0.33568)	(2.20665)	(0.08538)	(0.18381)	(0.04102)	(0.03295)	(0.04454)	(0.93313)
	[-2.67525]	[0.25924]	[-1.04975]	[1.04092]	[-0.70023]	[0.05247]	[-0.30800]	[-0.89094]
REPOSUP(-1)	0.271107	-2.591558	-0.063853	0.364642	0.079669	0.421695	-0.024705	1.495887
	(0.62972)	(4.14026)	(0.16020)	(0.34487)	(0.07637)	(0.06210)	(0.08356)	(1.75077)
	[0.43052]	[-0.62594]	[-0.39859]	[1.05732]	[1.04319]	[6.79040]	[-0.29565]	[0.85442]
REPOSUP(-2)	0.074212	-2.307489	-0.127974	-0.093200	-0.020599	0.065477	-0.011177	-1.397660
	(0.43720)	(2.87437)	(0.11122)	(0.23942)	(0.05302)	(0.04326)	(0.05801)	(1.21551)
	[0.16974]	[-0.80278]	[-1.15067]	[-0.38927]	[-0.38851]	[1.51367]	[-0.19267]	[-1.14986]
CPISUP(-1)	-0.389864	6.259464	0.173455	0.114508	0.020043	0.036008	0.253437	-1.265025
	(0.51410)	(3.38019)	(0.13078)	(0.28153)	(0.06234)	(0.05046)	(0.06855)	(1.42921)
	[-0.75835]	[1.85181]	[1.32630]	[0.40674]	[0.32150]	[0.71355]	[3.69730]	[-0.88512]

CPISUP(-2)	0.148387	1.406037	0.019565	-0.046220	0.030169	0.029801	0.003327	-0.351190
	(0.33106)	(2.17655)	(0.08422)	(0.18129)	(0.04015)	(0.03250)	(0.04428)	(0.92039)
	[0.44822]	[0.64599]	[0.23231]	[-0.25495]	[0.75144]	[0.91702]	[0.07514]	[-0.38156]
RET_JSE(-1)	0.006072	0.046440	0.004906	0.016518	0.004447	-0.000702	0.003781	-0.054227
	(0.02556)	(0.16806)	(0.00650)	(0.01400)	(0.00310)	(0.00251)	(0.00339)	(0.07143)
	[0.23754]	[0.27633]	[0.75428]	[1.17996]	[1.43465]	[-0.27972]	[1.11463]	[-0.75912]
RET_JSE(-2)	-0.004294	-0.045459	0.005000	0.005122	0.000752	-7.15E-05	0.000465	0.025167
	(0.01594)	(0.10480)	(0.00406)	(0.00873)	(0.00193)	(0.00156)	(0.00211)	(0.04467)
	[-0.26941]	[-0.43378]	[1.23300]	[0.58682]	[0.38917]	[-0.04572]	[0.21992]	[0.56336]
C	-0.002770	-0.003352	-0.000607	-0.000217	-0.000467	-9.61E-06	-0.000191	0.006219
	(0.00168)	(0.01104)	(0.00043)	(0.00092)	(0.00020)	(0.00016)	(0.00022)	(0.00467)
	[-1.64991]	[-0.30364]	[-1.42064]	[-0.23565]	[-2.29158]	[-0.05833]	[-0.85601]	[1.33194]
R-squared	0.596299	0.564948	0.226535	0.574269	0.726722	0.526682	0.315670	0.117463
Adj. R-squared	0.530389	0.493919	0.100254	0.504761	0.682105	0.449405	0.203943	-0.026625
Sum sq. resids	0.040621	1.765564	0.001823	0.012580	0.000612	0.000293	0.000524	0.226348
S.E. equation	0.020359	0.134224	0.004313	0.011330	0.002498	0.001729	0.002312	0.048059
F-statistic	9.047117	7.953766	1.793906	8.262007	16.28804	6.815549	2.825362	0.815215
Mean dependent	-0.004933	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.029709	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 37: BVAR estimates – Barclays Africa Group

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETBARCLAYS_AFRIGRP	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETBARCLAYS_AFRIGRP(-1)	0.550722	-0.035472	-0.013500	-0.023899	-0.012342	-0.004199	0.009998	-0.132142
	(0.05602)	(0.43384)	(0.01679)	(0.03614)	(0.00800)	(0.00648)	(0.00876)	(0.18346)
	[9.83114]	[-0.08176]	[-0.80417]	[-0.66128]	[-1.54227]	[-0.64816]	[1.14183]	[-0.72028]
RETBARCLAYS_AFRIGRP(-2)	-0.056086	-0.389221	0.000230	0.026889	-0.012817	-0.001341	0.002506	-0.078526
	(0.04170)	(0.32192)	(0.01246)	(0.02682)	(0.00594)	(0.00481)	(0.00650)	(0.13613)
	[-1.34505]	[-1.20905]	[0.01845]	[1.00274]	[-2.15833]	[-0.27909]	[0.38576]	[-0.57684]
DCA(-1)	0.002447	0.564697	-0.000680	0.004358	0.000562	-0.001068	-0.001222	0.003636
	(0.00711)	(0.05554)	(0.00214)	(0.00461)	(0.00102)	(0.00083)	(0.00112)	(0.02339)
	[0.34417]	[10.1673]	[-0.31785]	[0.94588]	[0.55076]	[-1.29336]	[-1.09437]	[0.15548]
DCA(-2)	-0.002351	-0.058210	-7.57E-05	-0.002795	0.000447	-0.000205	-0.000751	0.009170
	(0.00531)	(0.04164)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01748)
	[-0.44261]	[-1.39802]	[-0.04735]	[-0.81189]	[0.58654]	[-0.33175]	[-0.90097]	[0.52475]

LOGOIL(-1)	-0.192046	0.677104	0.093858	0.167459	0.001992	0.055454	0.024951	0.041889
	(0.23802)	(1.85145)	(0.07202)	(0.15422)	(0.03415)	(0.02764)	(0.03737)	(0.78319)
	[-0.80687]	[0.36572]	[1.30330]	[1.08586]	[0.05833]	[2.00601]	[0.66769]	[0.05348]
LOGOIL(-2)	0.007397	-0.189329	0.027070	0.006886	0.016418	0.013667	0.000608	0.223441
	(0.14759)	(1.14808)	(0.04478)	(0.09563)	(0.02118)	(0.01714)	(0.02317)	(0.48552)
	[0.05012]	[-0.16491]	[0.60447]	[0.07201]	[0.77525]	[0.79730]	[0.02625]	[0.46020]
GDPSUP(-1)	-0.012081	-0.159468	0.006818	0.573550	0.005177	0.012003	-0.012439	-0.078493
	(0.08617)	(0.67034)	(0.02593)	(0.05608)	(0.01236)	(0.01001)	(0.01353)	(0.28344)
	[-0.14019]	[-0.23789]	[0.26289]	[10.2276]	[0.41872]	[1.19929]	[-0.91955]	[-0.27693]
GDPSUP(-2)	0.115878	-0.943049	-0.007002	-0.058567	0.010028	0.002478	-0.001807	-0.012150
	(0.06392)	(0.49723)	(0.01924)	(0.04173)	(0.00917)	(0.00742)	(0.01003)	(0.21025)
	[1.81291]	[-1.89660]	[-0.36397]	[-1.40348]	[1.09344]	[0.33387]	[-0.18006]	[-0.05779]
FEDSUP(-1)	0.128229	1.082914	-0.094139	0.161890	0.697607	0.017114	-0.065154	0.002127
	(0.34819)	(2.70831)	(0.10479)	(0.22559)	(0.05019)	(0.04044)	(0.05466)	(1.14532)
	[0.36828]	[0.39985]	[-0.89836]	[0.71762]	[13.8984]	[0.42320]	[-1.19201]	[0.00186]
FEDSUP(-2)	-0.135944	0.582562	-0.086541	0.194243	-0.024409	0.002595	-0.008922	-0.711508
	(0.28171)	(2.19131)	(0.08479)	(0.18253)	(0.04073)	(0.03272)	(0.04423)	(0.92664)
	[-0.48257]	[0.26585]	[-1.02067]	[1.06416]	[-0.59936]	[0.07931]	[-0.20173]	[-0.76783]
REPOSUP(-1)	1.065328	-2.532867	-0.047154	0.391435	0.095663	0.426914	-0.037992	1.653861
	(0.53598)	(4.16928)	(0.16132)	(0.34729)	(0.07691)	(0.06254)	(0.08415)	(1.76303)
	[1.98763]	[-0.60751]	[-0.29230]	[1.12710]	[1.24390]	[6.82665]	[-0.45150]	[0.93808]
REPOSUP(-2)	0.540306	-1.838269	-0.120578	-0.103103	-0.001069	0.069686	-0.026169	-1.318419
	(0.37210)	(2.89446)	(0.11199)	(0.24110)	(0.05339)	(0.04356)	(0.05842)	(1.22401)
	[1.45205]	[-0.63510]	[-1.07665]	[-0.42764]	[-0.02002]	[1.59965]	[-0.44798]	[-1.07713]
CPISUP(-1)	-0.513160	5.965469	0.186380	0.127515	0.030461	0.037899	0.273000	-0.846795
	(0.43208)	(3.36130)	(0.13005)	(0.27996)	(0.06200)	(0.05018)	(0.06816)	(1.42123)
	[-1.18765]	[1.77475]	[1.43313]	[0.45548]	[0.49134]	[0.75524]	[4.00520]	[-0.59582]
CPISUP(-2)	-0.113031	1.096313	0.019015	-0.035319	0.021997	0.028250	0.013020	-0.325196
	(0.28019)	(2.17959)	(0.08433)	(0.18155)	(0.04020)	(0.03254)	(0.04434)	(0.92168)
	[-0.40341]	[0.50299]	[0.22547]	[-0.19454]	[0.54714]	[0.86810]	[0.29362]	[-0.35283]
RET_JSE(-1)	-0.020509	0.022919	0.005101	0.017632	0.004074	-0.000754	0.004484	-0.048034
	(0.02157)	(0.16781)	(0.00650)	(0.01398)	(0.00310)	(0.00251)	(0.00339)	(0.07133)
	[-0.95067]	[0.13658]	[0.78540]	[1.26141]	[1.31609]	[-0.30083]	[1.32393]	[-0.67340]
RET_JSE(-2)	-0.005136	-0.051220	0.004921	0.005222	0.000531	-0.000120	0.000649	0.024423
	(0.01348)	(0.10488)	(0.00406)	(0.00874)	(0.00193)	(0.00157)	(0.00212)	(0.04471)
	[-0.38095]	[-0.48837]	[1.21246]	[0.59778]	[0.27457]	[-0.07676]	[0.30643]	[0.54625]
C	0.000939	-0.004231	-0.000534	-9.38E-05	-0.000412	6.91E-06	-0.000170	0.007616
	(0.00141)	(0.01099)	(0.00043)	(0.00092)	(0.00020)	(0.00016)	(0.00022)	(0.00465)
	[0.66441]	[-0.38487]	[-1.25489]	[-0.10240]	[-2.03109]	[0.04208]	[-0.76704]	[1.63797]
R-squared	0.600812	0.569464	0.222671	0.576535	0.746237	0.530957	0.315619	0.085016
Adj. R-squared	0.535639	0.499172	0.095760	0.507397	0.704806	0.454379	0.203883	-0.064369
Sum sq. resids	0.028430	1.747236	0.001832	0.012513	0.000568	0.000290	0.000524	0.234670
S.E. equation	0.017032	0.133525	0.004324	0.011300	0.002408	0.001722	0.002312	0.048935
F-statistic	9.218660	8.101449	1.754546	8.338992	18.01170	6.933504	2.824689	0.569108
Mean dependent	0.001233	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.024995	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 38: BVAR estimates – BHP Billiton PLC

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETBHL_BILTON_PLC	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETBHL_BILTON_PLC(-1)	0.481407	0.434170	0.005678	0.010016	-0.008688	0.005805	-0.001677	0.005292
	(0.05820)	(0.43108)	(0.01668)	(0.03591)	(0.00795)	(0.00644)	(0.00870)	(0.18229)
	[8.27133]	[1.00717]	[0.34045]	[0.27896]	[-1.09249]	[0.90180]	[-0.19279]	[0.02903]
RETBHL_BILTON_PLC(-2)	-0.062388	-0.059201	0.002107	-0.009967	0.001629	0.002282	0.002316	0.084658
	(0.04181)	(0.30868)	(0.01194)	(0.02571)	(0.00569)	(0.00461)	(0.00623)	(0.13053)
	[-1.49221]	[-0.19179]	[0.17641]	[-0.38765]	[0.28614]	[0.49505]	[0.37177]	[0.64857]
DCA(-1)	0.004038	0.561761	-0.000880	0.003988	0.000681	-0.001199	-0.001180	0.002177
	(0.00746)	(0.05571)	(0.00215)	(0.00462)	(0.00102)	(0.00083)	(0.00112)	(0.02346)
	[0.54146]	[10.0836]	[-0.40981]	[0.86307]	[0.66523]	[-1.44818]	[-1.05428]	[0.09280]
DCA(-2)	-0.002540	-0.059086	-7.02E-05	-0.002622	0.000401	-0.000214	-0.000764	0.008596
	(0.00556)	(0.04165)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01748)
	[-0.45707]	[-1.41877]	[-0.04392]	[-0.76163]	[0.52639]	[-0.34738]	[-0.91611]	[0.49177]
LOGOIL(-1)	-0.210812	0.950848	0.101965	0.170040	0.014263	0.058942	0.017500	0.147219
	(0.24715)	(1.83832)	(0.07150)	(0.15313)	(0.03391)	(0.02745)	(0.03711)	(0.77766)
	[-0.85298]	[0.51724]	[1.42607]	[1.11047]	[0.42060]	[2.14739]	[0.47164]	[0.18931]
LOGOIL(-2)	-0.089877	-0.032913	0.031047	0.005644	0.022333	0.015752	-0.002601	0.283092
	(0.15376)	(1.14373)	(0.04461)	(0.09527)	(0.02110)	(0.01708)	(0.02308)	(0.48369)
	[-0.58451]	[-0.02878]	[0.69595]	[0.05924]	[1.05856]	[0.92241]	[-0.11267]	[0.58528]
GDPSUP(-1)	0.042647	-0.148405	0.010249	0.577453	0.010503	0.012878	-0.015423	-0.034357
	(0.08886)	(0.66099)	(0.02557)	(0.05529)	(0.01219)	(0.00987)	(0.01334)	(0.27949)
	[0.47995]	[-0.22452]	[0.40078]	[10.4439]	[0.86150]	[1.30487]	[-1.15621]	[-0.12293]
GDPSUP(-2)	0.010374	-0.929076	-0.008026	-0.062103	0.011038	0.001984	-0.001639	-0.015607
	(0.06669)	(0.49608)	(0.01919)	(0.04163)	(0.00915)	(0.00741)	(0.01001)	(0.20976)
	[0.15556]	[-1.87282]	[-0.41818]	[-1.49175]	[1.20636]	[0.26783]	[-0.16374]	[-0.07440]
FEDSUP(-1)	0.212657	1.707678	-0.090160	0.139035	0.702640	0.023283	-0.066775	0.106595
	(0.36407)	(2.70797)	(0.10478)	(0.22557)	(0.05019)	(0.04043)	(0.05465)	(1.14517)
	[0.58411]	[0.63061]	[-0.86050]	[0.61637]	[14.0000]	[0.57585]	[-1.22183]	[0.09308]
FEDSUP(-2)	0.566776	0.028168	-0.092761	0.201157	-0.029008	-0.003141	-0.004550	-0.793737
	(0.29613)	(2.20256)	(0.08522)	(0.18347)	(0.04094)	(0.03289)	(0.04445)	(0.93141)
	[1.91391]	[0.01279]	[-1.08844]	[1.09641]	[-0.70859]	[-0.09550]	[-0.10235]	[-0.85219]
REPOSUP(-1)	-1.277100	-1.874489	-0.054596	0.377918	0.069877	0.430445	-0.029824	1.503523

	(0.56340)	(4.19042)	(0.16214)	(0.34905)	(0.07729)	(0.06286)	(0.08457)	(1.77198)
	[-2.26676]	[-0.44733]	[-0.33672]	[1.08269]	[0.90403]	[6.84806]	[-0.35265]	[0.84850]
REPOSUP(-2)	-0.008472	-1.932194	-0.126647	-0.106229	-0.026364	0.070970	-0.014268	-1.414561
	(0.38867)	(2.89090)	(0.11186)	(0.24080)	(0.05333)	(0.04351)	(0.05834)	(1.22251)
	[-0.02180]	[-0.66837]	[-1.13221]	[-0.44114]	[-0.49439]	[1.63114]	[-0.24455]	[-1.15710]
CPISUP(-1)	-0.133274	5.715877	0.193291	0.156355	0.026702	0.039540	0.270573	-0.828373
	(0.44928)	(3.34223)	(0.12932)	(0.27837)	(0.06164)	(0.04990)	(0.06777)	(1.41318)
	[-0.29664]	[1.71020]	[1.49472]	[0.56167]	[0.43316]	[0.79242]	[3.99238]	[-0.58618]
CPISUP(-2)	-0.120804	1.311136	0.025803	-0.035119	0.031948	0.031508	0.007419	-0.226004
	(0.29204)	(2.17231)	(0.08405)	(0.18094)	(0.04007)	(0.03243)	(0.04419)	(0.91860)
	[-0.41365]	[0.60357]	[0.30699]	[-0.19409]	[0.79731]	[0.97145]	[0.16787]	[-0.24603]
RET_JSE(-1)	-0.017361	0.030414	0.005377	0.017563	0.004727	-0.000668	0.004180	-0.043330
	(0.02252)	(0.16753)	(0.00648)	(0.01395)	(0.00309)	(0.00250)	(0.00338)	(0.07121)
	[-0.77083]	[0.18154]	[0.82923]	[1.25855]	[1.52959]	[-0.26705]	[1.23634]	[-0.60849]
RET_JSE(-2)	0.015272	-0.044443	0.005103	0.005320	0.000769	-3.48E-05	0.000483	0.026629
	(0.01409)	(0.10480)	(0.00406)	(0.00873)	(0.00193)	(0.00156)	(0.00212)	(0.04467)
	[1.08394]	[-0.42408]	[1.25849]	[0.60939]	[0.39792]	[-0.02226]	[0.22843]	[0.59608]
C	-0.001061	-0.003480	-0.000532	-0.000110	-0.000476	2.63E-05	-0.000145	0.007605
	(0.00149)	(0.01108)	(0.00043)	(0.00092)	(0.00020)	(0.00017)	(0.00022)	(0.00469)
	[-0.71261]	[-0.31412]	[-1.24015]	[-0.11920]	[-2.32861]	[0.15875]	[-0.64737]	[1.62323]
R-squared	0.519970	0.563557	0.223036	0.573530	0.723019	0.540955	0.296076	0.077282
Adj. R-squared	0.441598	0.492301	0.096185	0.503902	0.677798	0.466009	0.181150	-0.073366
Sum sq. resids	0.029498	1.771207	0.001832	0.012602	0.000620	0.000284	0.000539	0.236654
S.E. equation	0.017349	0.134438	0.004323	0.011340	0.002515	0.001703	0.002345	0.049141
F-statistic	6.634624	7.908914	1.758252	8.237087	15.98842	7.217918	2.576227	0.512995
Mean dependent	-0.003386	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.023217	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 39: BVAR estimates – Bidvest Group Ltd

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETBIDVEST_GRP	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETBIDVEST_GRP(-1)	0.594062	0.112179	-0.026279	-0.007216	-0.011746	-0.006432	0.008272	-0.030561
	(0.05332)	(0.51646)	(0.01998)	(0.04302)	(0.00953)	(0.00771)	(0.01042)	(0.21839)
	[11.1424]	[0.21721]	[-1.31499]	[-0.16773]	[-1.23300]	[-0.83408]	[0.79359]	[-0.13994]
RETBIDVEST_GRP(-2)	-0.077265	-0.423285	0.004279	0.040401	-0.005650	-0.001634	0.001546	-0.039406
	(0.04076)	(0.39363)	(0.01523)	(0.03279)	(0.00726)	(0.00588)	(0.00794)	(0.16645)
	[-1.89567]	[-1.07535]	[0.28098]	[1.23218]	[-0.77822]	[-0.27804]	[0.19461]	[-0.23675]

DCA(-1)	-1.41E-05	0.565024	-0.000560	0.004198	0.000643	-0.001043	-0.001231	0.003444
	(0.00569)	(0.05556)	(0.00214)	(0.00461)	(0.00102)	(0.00083)	(0.00112)	(0.02339)
	[-0.00248]	[10.1697]	[-0.26157]	[0.91084]	[0.63025]	[-1.26318]	[-1.10226]	[0.14720]
DCA(-2)	-0.002551	-0.057656	-9.03E-05	-0.002856	0.000434	-0.000201	-0.000756	0.009178
	(0.00425)	(0.04165)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01748)
	[-0.60031]	[-1.38413]	[-0.05644]	[-0.82942]	[0.56878]	[-0.32503]	[-0.90584]	[0.52496]
LOGOIL(-1)	-0.102643	0.732937	0.089099	0.184832	0.006005	0.054108	0.023372	0.119150
	(0.19082)	(1.85620)	(0.07220)	(0.15461)	(0.03424)	(0.02771)	(0.03747)	(0.78522)
	[-0.53790]	[0.39486]	[1.23401]	[1.19544]	[0.17538]	[1.95233]	[0.62381]	[0.15174]
LOGOIL(-2)	0.043227	-0.147286	0.026588	0.013124	0.019674	0.013555	-0.000726	0.263671
	(0.11792)	(1.14708)	(0.04474)	(0.09555)	(0.02116)	(0.01713)	(0.02315)	(0.48510)
	[0.36658]	[-0.12840]	[0.59423]	[0.13736]	[0.92979]	[0.79140]	[-0.03135]	[0.54353]
GDPSUP(-1)	0.052400	-0.098003	0.006733	0.577001	0.008092	0.012367	-0.014299	-0.038122
	(0.06834)	(0.66480)	(0.02572)	(0.05561)	(0.01226)	(0.00993)	(0.01342)	(0.28110)
	[0.76679]	[-0.14742]	[0.26180]	[10.3750]	[0.65990]	[1.24590]	[-1.06581]	[-0.13562]
GDPSUP(-2)	0.106105	-0.933564	-0.005127	-0.060055	0.011511	0.002934	-0.002284	-0.009341
	(0.05123)	(0.49840)	(0.01928)	(0.04183)	(0.00919)	(0.00744)	(0.01006)	(0.21074)
	[2.07102]	[-1.87314]	[-0.26590]	[-1.43573]	[1.25219]	[0.39434]	[-0.22710]	[-0.04432]
FEDSUP(-1)	-0.048170	1.181051	-0.105244	0.161429	0.698365	0.013682	-0.061504	0.019328
	(0.27822)	(2.70642)	(0.10472)	(0.22544)	(0.05016)	(0.04041)	(0.05462)	(1.14452)
	[-0.17314]	[0.43639]	[-1.00503]	[0.71606]	[13.9240]	[0.33858]	[-1.12602]	[0.01689]
FEDSUP(-2)	0.090782	0.320765	-0.086786	0.207595	-0.034013	0.001506	-0.006218	-0.782402
	(0.22445)	(2.18345)	(0.08449)	(0.18188)	(0.04058)	(0.03260)	(0.04407)	(0.92333)
	[0.40446]	[0.14691]	[-1.02724]	[1.14140]	[-0.83824]	[0.04621]	[-0.14111]	[-0.84737]
REPOSUP(-1)	0.396359	-2.767040	-0.048099	0.382197	0.086222	0.424639	-0.030175	1.509880
	(0.42696)	(4.15340)	(0.16071)	(0.34597)	(0.07661)	(0.06230)	(0.08383)	(1.75632)
	[0.92833]	[-0.66621]	[-0.29929]	[1.10472]	[1.12542]	[6.81614]	[-0.35997]	[0.85968]
REPOSUP(-2)	0.279690	-2.038913	-0.120507	-0.118122	-0.013238	0.069029	-0.020370	-1.463321
	(0.29634)	(2.88270)	(0.11154)	(0.24012)	(0.05317)	(0.04338)	(0.05818)	(1.21903)
	[0.94382]	[-0.70729]	[-1.08041]	[-0.49193]	[-0.24895]	[1.59110]	[-0.35013]	[-1.20040]
CPISUP(-1)	-0.218793	5.911076	0.190257	0.137757	0.029483	0.039557	0.269600	-0.824327
	(0.34409)	(3.34756)	(0.12952)	(0.27881)	(0.06174)	(0.04998)	(0.06788)	(1.41543)
	[-0.63587]	[1.76578]	[1.46892]	[0.49408]	[0.47752]	[0.79150]	[3.97165]	[-0.58239]
CPISUP(-2)	-0.085929	1.264269	0.021948	-0.034438	0.031025	0.029815	0.008522	-0.239315
	(0.22334)	(2.17264)	(0.08407)	(0.18097)	(0.04008)	(0.03244)	(0.04420)	(0.91874)
	[-0.38475]	[0.58190]	[0.26108]	[-0.19030]	[0.77415]	[0.91911]	[0.19281]	[-0.26048]
RET_JSE(-1)	-0.018160	0.034450	0.005473	0.017432	0.004729	-0.000597	0.004154	-0.042657
	(0.01722)	(0.16752)	(0.00648)	(0.01395)	(0.00309)	(0.00250)	(0.00338)	(0.07120)
	[-1.05456]	[0.20565]	[0.84404]	[1.24929]	[1.53053]	[-0.23879]	[1.22864]	[-0.59909]
RET_JSE(-2)	0.001318	-0.046269	0.004926	0.005214	0.000742	-9.48E-05	0.000551	0.026698
	(0.01077)	(0.10481)	(0.00406)	(0.00873)	(0.00193)	(0.00156)	(0.00212)	(0.04468)
	[0.12237]	[-0.44146]	[1.21461]	[0.59721]	[0.38359]	[-0.06059]	[0.26045]	[0.59754]
C	0.002876	-0.004035	-0.000473	-0.000191	-0.000392	2.56E-05	-0.000183	0.007485
	(0.00114)	(0.01110)	(0.00043)	(0.00092)	(0.00020)	(0.00017)	(0.00022)	(0.00470)
	[2.51947]	[-0.36344]	[-1.10198]	[-0.20648]	[-1.91535]	[0.15441]	[-0.81585]	[1.59383]

R-squared	0.601579	0.566866	0.234034	0.581087	0.727204	0.532069	0.302580	0.072281
Adj. R-squared	0.536531	0.496150	0.108978	0.512693	0.682665	0.455672	0.188715	-0.079183
Sum sq. resids	0.018899	1.757780	0.001806	0.012379	0.000611	0.000290	0.000534	0.237936
S.E. equation	0.013887	0.133927	0.004292	0.011239	0.002496	0.001720	0.002334	0.049274
F-statistic	9.248187	8.016106	1.871434	8.496176	16.32764	6.964527	2.657367	0.477218
Mean dependent	0.004754	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.020399	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 40: BVAR estimates – Richemont

Bayesian VAR Estimates
Date: 03/22/17 Time: 20:44
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETCIE_FINANCIAL_RICHMT	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETCIE_FINANCIAL_RICHMT(-1)	0.644236	0.074510	-0.004891	-0.051484	-0.002464	-0.002385	0.009784	-0.052306
	(0.05254)	(0.44984)	(0.01740)	(0.03747)	(0.00830)	(0.00672)	(0.00908)	(0.19022)
	[12.2607]	[0.16563]	[-0.28103]	[-1.37397]	[-0.29695]	[-0.35506]	[1.07777]	[-0.27498]
RETCIE_FINANCIAL_RICHMT(-2)	-0.050135	-0.460740	-0.001180	-0.008774	-0.002385	0.001209	-0.001566	-0.014696
	(0.04100)	(0.34990)	(0.01354)	(0.02914)	(0.00645)	(0.00522)	(0.00706)	(0.14796)
	[-1.22287]	[-1.31677]	[-0.08720]	[-0.30104]	[-0.36955]	[0.23151]	[-0.22180]	[-0.09932]
DCA(-1)	-0.000403	0.567291	-0.000685	0.004887	0.000623	-0.001049	-0.001333	0.004262
	(0.00647)	(0.05582)	(0.00215)	(0.00463)	(0.00103)	(0.00083)	(0.00112)	(0.02350)
	[-0.06240]	[10.1620]	[-0.31854]	[1.05530]	[0.60743]	[-1.26401]	[-1.18847]	[0.18134]
DCA(-2)	-0.004682	-0.055279	-5.12E-05	-0.002596	0.000435	-0.000217	-0.000738	0.009152
	(0.00482)	(0.04174)	(0.00160)	(0.00345)	(0.00076)	(0.00062)	(0.00084)	(0.01752)
	[-0.97167]	[-1.32430]	[-0.03196]	[-0.75214]	[0.56939]	[-0.35026]	[-0.88228]	[0.52238]
LOGOIL(-1)	-0.217399	0.841551	0.100029	0.152422	0.014446	0.058072	0.020382	0.140382
	(0.21401)	(1.83999)	(0.07157)	(0.15326)	(0.03394)	(0.02747)	(0.03714)	(0.77837)
	[-1.01584]	[0.45737]	[1.39771]	[0.99450]	[0.42561]	[2.11378]	[0.54878]	[0.18035]
LOGOIL(-2)	-0.098012	-0.100002	0.029535	-0.003300	0.022491	0.014828	-0.001225	0.268975
	(0.13313)	(1.14464)	(0.04465)	(0.09534)	(0.02111)	(0.01709)	(0.02310)	(0.48407)
	[-0.73619]	[-0.08737]	[0.66151]	[-0.03461]	[1.06520]	[0.86760]	[-0.05301]	[0.55565]
GDPSUP(-1)	0.046876	-0.200822	0.009274	0.563945	0.008736	0.013039	-0.013579	-0.049219
	(0.07761)	(0.66736)	(0.02582)	(0.05583)	(0.01231)	(0.00996)	(0.01347)	(0.28218)
	[0.60396]	[-0.30092]	[0.35918]	[10.1015]	[0.70970]	[1.30861]	[-1.00827]	[-0.17442]
GDPSUP(-2)	0.099947	-0.923267	-0.007225	-0.057944	0.010823	0.002637	-0.002436	-0.006655
	(0.05782)	(0.49717)	(0.01924)	(0.04172)	(0.00917)	(0.00742)	(0.01003)	(0.21022)
	[1.72851]	[-1.85705]	[-0.37563]	[-1.38874]	[1.18021]	[0.35525]	[-0.24276]	[-0.03166]

FEDSUP(-1)	-0.088767	1.370642	-0.095147	0.138180	0.708063	0.018258	-0.067328	0.063168
	(0.31315)	(2.69244)	(0.10418)	(0.22427)	(0.04990)	(0.04020)	(0.05434)	(1.13861)
	[-0.28346]	[0.50907]	[-0.91332]	[0.61612]	[14.1908]	[0.45415]	[-1.23905]	[0.05548]
FEDSUP(-2)	-0.017176	0.416887	-0.088199	0.212255	-0.034357	0.000882	-0.005798	-0.779153
	(0.25403)	(2.18411)	(0.08451)	(0.18193)	(0.04059)	(0.03261)	(0.04408)	(0.92360)
	[-0.06761]	[0.19087]	[-1.04365]	[1.16667]	[-0.84647]	[0.02703]	[-0.13153]	[-0.84360]
REPOSUP(-1)	0.150242	-2.496205	-0.060646	0.381034	0.084253	0.422995	-0.030248	1.533327
	(0.48155)	(4.14048)	(0.16021)	(0.34489)	(0.07637)	(0.06210)	(0.08357)	(1.75086)
	[0.31199]	[-0.60288]	[-0.37854]	[1.10479]	[1.10315]	[6.81102]	[-0.36197]	[0.87576]
REPOSUP(-2)	0.165779	-2.106238	-0.130956	-0.088491	-0.020917	0.065244	-0.017597	-1.480773
	(0.33424)	(2.87375)	(0.11119)	(0.23937)	(0.05301)	(0.04325)	(0.05800)	(1.21525)
	[0.49598]	[-0.73292]	[-1.17773]	[-0.36968]	[-0.39460]	[1.50861]	[-0.30341]	[-1.21849]
CPISUP(-1)	0.326935	6.019817	0.197617	0.207003	0.030850	0.039804	0.263463	-0.788224
	(0.39069)	(3.35943)	(0.12998)	(0.27981)	(0.06196)	(0.05015)	(0.06812)	(1.42046)
	[0.83681]	[1.79192]	[1.52033]	[0.73980]	[0.49789]	[0.79363]	[3.86740]	[-0.55491]
CPISUP(-2)	0.017017	1.368423	0.026136	-0.024466	0.033741	0.030801	0.006105	-0.221268
	(0.25279)	(2.17343)	(0.08410)	(0.18103)	(0.04009)	(0.03245)	(0.04422)	(0.91908)
	[0.06732]	[0.62961]	[0.31079]	[-0.13514]	[0.84162]	[0.94914]	[0.13807]	[-0.24075]
RET_JSE(-1)	-0.007194	0.028955	0.005378	0.017128	0.004636	-0.000624	0.004234	-0.043419
	(0.01949)	(0.16754)	(0.00648)	(0.01396)	(0.00309)	(0.00250)	(0.00338)	(0.07121)
	[-0.36917]	[0.17282]	[0.82929]	[1.22734]	[1.50020]	[-0.24961]	[1.25225]	[-0.60970]
RET_JSE(-2)	0.001185	-0.047639	0.005052	0.004908	0.000795	-6.51E-05	0.000553	0.026552
	(0.01219)	(0.10479)	(0.00405)	(0.00873)	(0.00193)	(0.00156)	(0.00211)	(0.04467)
	[0.09720]	[-0.45461]	[1.24582]	[0.56224]	[0.41125]	[-0.04163]	[0.26130]	[0.59438]
C	0.000506	-0.004128	-0.000549	2.29E-06	-0.000443	-5.75E-07	-0.000163	0.007383
	(0.00128)	(0.01099)	(0.00043)	(0.00092)	(0.00020)	(0.00016)	(0.00022)	(0.00465)
	[0.39585]	[-0.37555]	[-1.28989]	[0.00250]	[-2.18456]	[-0.00350]	[-0.73458]	[1.58805]
R-squared	0.628320	0.571220	0.221527	0.578375	0.722673	0.527127	0.303240	0.072548
Adj. R-squared	0.567638	0.501215	0.094429	0.509538	0.677395	0.449924	0.189483	-0.078873
Sum sq. resids	0.024751	1.740109	0.001835	0.012459	0.000621	0.000293	0.000533	0.237868
S.E. equation	0.015892	0.133252	0.004327	0.011275	0.002517	0.001729	0.002333	0.049267
F-statistic	10.35424	8.159712	1.742964	8.402117	15.96083	6.827746	2.665684	0.479113
Mean dependent	0.001549	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.024169	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 41: BVAR estimates – FirstRand Ltd

Bayesian VAR Estimates
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETFIRSTRAND_LTD	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE

RETFIRSTRAND_LTD(-1)	0.653067	0.097158	-0.012357	0.022219	0.007928	0.006636	0.000794	-0.113528
	(0.05196)	(0.59265)	(0.02293)	(0.04937)	(0.01093)	(0.00885)	(0.01196)	(0.25061)
	[12.5697]	[0.16394]	[-0.53889]	[0.45006]	[0.72517]	[0.74990]	[0.06637]	[-0.45301]
RETFIRSTRAND_LTD(-2)	-0.055237	-0.187261	-0.000430	0.025742	-0.006398	-0.000397	0.000392	-0.074171
	(0.04043)	(0.45984)	(0.01779)	(0.03830)	(0.00848)	(0.00687)	(0.00928)	(0.19445)
	[-1.36636]	[-0.40723]	[-0.02414]	[0.67207]	[-0.75432]	[-0.05781]	[0.04222]	[-0.38143]
DCA(-1)	-0.004892	0.566605	-0.000817	0.004234	0.000567	-0.001064	-0.001170	0.002514
	(0.00482)	(0.05542)	(0.00214)	(0.00460)	(0.00102)	(0.00082)	(0.00111)	(0.02333)
	[-1.01591]	[10.2244]	[-0.38247]	[0.92098]	[0.55701]	[-1.29147]	[-1.05013]	[0.10775]
DCA(-2)	-0.001908	-0.059559	-0.000104	-0.002560	0.000429	-0.000184	-0.000749	0.008516
	(0.00361)	(0.04165)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01748)
	[-0.52888]	[-1.42999]	[-0.06513]	[-0.74347]	[0.56302]	[-0.29816]	[-0.89738]	[0.48716]
LOGOIL(-1)	-0.047048	0.863589	0.098285	0.180593	0.015648	0.060083	0.018288	0.107096
	(0.16076)	(1.84206)	(0.07165)	(0.15344)	(0.03398)	(0.02750)	(0.03718)	(0.77924)
	[-0.29265]	[0.46882]	[1.37179]	[1.17698]	[0.46052]	[2.18454]	[0.49186]	[0.13744]
LOGOIL(-2)	0.050514	-0.089080	0.028596	0.012575	0.023084	0.015925	-0.002389	0.250161
	(0.09999)	(1.14571)	(0.04469)	(0.09543)	(0.02113)	(0.01711)	(0.02312)	(0.48453)
	[0.50519]	[-0.07775]	[0.63987]	[0.13177]	[1.09229]	[0.93094]	[-0.10331]	[0.51630]
GDPSUP(-1)	0.103973	-0.100549	0.011121	0.574993	0.010220	0.013165	-0.015603	-0.022853
	(0.05771)	(0.66131)	(0.02559)	(0.05532)	(0.01220)	(0.00987)	(0.01335)	(0.27963)
	[1.80167]	[-0.15205]	[0.43468]	[10.3944]	[0.83787]	[1.33332]	[-1.16920]	[-0.08173]
GDPSUP(-2)	0.093567	-0.915002	-0.006361	-0.064889	0.009997	0.001764	-0.001690	0.002161
	(0.04351)	(0.49859)	(0.01929)	(0.04184)	(0.00920)	(0.00744)	(0.01006)	(0.21082)
	[2.15040]	[-1.83519]	[-0.32976]	[-1.55073]	[1.08704]	[0.23694]	[-0.16796]	[0.01025]
FEDSUP(-1)	0.219395	1.418388	-0.087765	0.116050	0.705263	0.014171	-0.067263	0.150968
	(0.23646)	(2.70937)	(0.10483)	(0.22568)	(0.05021)	(0.04045)	(0.05468)	(1.14577)
	[0.92784]	[0.52351]	[-0.83721]	[0.51422]	[14.0466]	[0.35029]	[-1.23013]	[0.13176]
FEDSUP(-2)	-0.019046	0.365948	-0.086965	0.197091	-0.034180	0.000239	-0.005792	-0.748658
	(0.19079)	(2.18611)	(0.08459)	(0.18210)	(0.04063)	(0.03264)	(0.04412)	(0.92445)
	[-0.09983]	[0.16740]	[-1.02810]	[1.08233]	[-0.84132]	[0.00731]	[-0.13128]	[-0.80984]
REPOSUP(-1)	0.575384	-2.519471	-0.046563	0.314655	0.077516	0.414091	-0.028171	1.709251
	(0.36550)	(4.18797)	(0.16205)	(0.34885)	(0.07725)	(0.06282)	(0.08452)	(1.77096)
	[1.57424]	[-0.60160]	[-0.28734]	[0.90199]	[1.00343]	[6.59190]	[-0.33329]	[0.96516]
REPOSUP(-2)	0.109822	-2.107304	-0.124891	-0.133404	-0.022559	0.061125	-0.016019	-1.382391
	(0.25219)	(2.88959)	(0.11181)	(0.24069)	(0.05330)	(0.04349)	(0.05832)	(1.22195)
	[0.43548]	[-0.72927]	[-1.11704]	[-0.55425]	[-0.42324]	[1.40555]	[-0.27468]	[-1.13130]
CPISUP(-1)	0.130937	5.711235	0.193390	0.154321	0.026893	0.038480	0.270186	-0.831081
	(0.29163)	(3.34203)	(0.12931)	(0.27836)	(0.06164)	(0.04989)	(0.06777)	(1.41310)
	[0.44898]	[1.70891]	[1.49558]	[0.55440]	[0.43629]	[0.77123]	[3.98690]	[-0.58813]
CPISUP(-2)	0.067806	1.262229	0.025022	-0.034427	0.032493	0.030663	0.007417	-0.236334
	(0.18954)	(2.17192)	(0.08404)	(0.18091)	(0.04006)	(0.03243)	(0.04418)	(0.91844)
	[0.35773]	[0.58116]	[0.29775]	[-0.19030]	[0.81106]	[0.94558]	[0.16787]	[-0.25732]
RET_JSE(-1)	0.008563	0.030944	0.005367	0.018012	0.004628	-0.000596	0.004189	-0.044362
	(0.01463)	(0.16759)	(0.00649)	(0.01396)	(0.00309)	(0.00250)	(0.00338)	(0.07123)

	[0.58547]	[0.18464]	[0.82733]	[1.29029]	[1.49703]	[-0.23830]	[1.23839]	[-0.62277]
RET_JSE(-2)	0.004156	-0.047593	0.005063	0.005410	0.000794	-4.66E-05	0.000503	0.026323
	(0.00914)	(0.10479)	(0.00405)	(0.00873)	(0.00193)	(0.00156)	(0.00211)	(0.04467)
	[0.45450]	[-0.45419]	[1.24861]	[0.61979]	[0.41084]	[-0.02978]	[0.23772]	[0.58929]
C	0.001343	-0.004525	-0.000514	-0.000269	-0.000459	-2.53E-05	-0.000152	0.007906
	(0.00097)	(0.01112)	(0.00043)	(0.00093)	(0.00021)	(0.00017)	(0.00022)	(0.00470)
	[1.38353]	[-0.40690]	[-1.19472]	[-0.29037]	[-2.23927]	[-0.15250]	[-0.67637]	[1.68088]
R-squared	0.712463	0.561865	0.222055	0.577244	0.722907	0.526547	0.294441	0.077343
Adj. R-squared	0.665518	0.490333	0.095044	0.508222	0.677667	0.449249	0.179248	-0.073294
Sum sq. resids	0.013242	1.778075	0.001834	0.012492	0.000620	0.000293	0.000540	0.236638
S.E. equation	0.011624	0.134698	0.004326	0.011290	0.002516	0.001730	0.002348	0.049139
F-statistic	15.17661	7.854705	1.748309	8.363259	15.97949	6.811877	2.556061	0.513440
Mean dependent	0.002568	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.020099	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 42: BVAR estimates – Intu Properties PLC

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETINTU_PROPTIES_PLC	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETINTU_PROPTIES_PLC(-1)	0.712609	0.058179	0.004368	-0.001001	-0.007752	-0.002428	0.012964	0.092294
	(0.04990)	(0.49786)	(0.01926)	(0.04147)	(0.00918)	(0.00743)	(0.01005)	(0.21052)
	[14.2801]	[0.11686]	[0.22676]	[-0.02413]	[-0.84420]	[-0.32663]	[1.29024]	[0.43840]
RETINTU_PROPTIES_PLC(-2)	-0.056726	-0.401527	0.014020	0.002200	-0.004451	0.002833	-0.002453	0.109024
	(0.04047)	(0.40262)	(0.01558)	(0.03354)	(0.00743)	(0.00601)	(0.00813)	(0.17025)
	[-1.40156]	[-0.99728]	[0.89999]	[0.06560]	[-0.59937]	[0.47123]	[-0.30188]	[0.64037]
DCA(-1)	-0.004418	0.566292	-0.000777	0.004015	0.000621	-0.001065	-0.001266	0.002899
	(0.00551)	(0.05550)	(0.00214)	(0.00460)	(0.00102)	(0.00083)	(0.00112)	(0.02337)
	[-0.80123]	[10.2043]	[-0.36347]	[0.87218]	[0.60930]	[-1.29035]	[-1.13541]	[0.12405]
DCA(-2)	-0.004651	-0.057408	-0.000120	-0.002690	0.000415	-0.000226	-0.000705	0.008722
	(0.00413)	(0.04172)	(0.00160)	(0.00345)	(0.00076)	(0.00062)	(0.00084)	(0.01751)
	[-1.12556]	[-1.37602]	[-0.07487]	[-0.77988]	[0.54275]	[-0.36562]	[-0.84413]	[0.49811]
LOGOIL(-1)	-0.206939	0.964647	0.098875	0.167280	0.016444	0.058060	0.018179	0.135155
	(0.18344)	(1.83817)	(0.07149)	(0.15311)	(0.03391)	(0.02745)	(0.03710)	(0.77759)
	[-1.12811]	[0.52479]	[1.38297]	[1.09253]	[0.48495]	[2.11543]	[0.48998]	[0.17381]
LOGOIL(-2)	-0.077455	-0.054814	0.030266	0.005081	0.022667	0.014827	-0.001586	0.281256
	(0.11415)	(1.14387)	(0.04462)	(0.09528)	(0.02110)	(0.01708)	(0.02309)	(0.48375)
	[-0.67852]	[-0.04792]	[0.67834]	[0.05333]	[1.07425]	[0.86815]	[-0.06869]	[0.58141]
GDPSUP(-1)	0.047348	-0.118951	0.010959	0.578181	0.009615	0.013309	-0.015264	-0.030143

	(0.06588)	(0.66027)	(0.02555)	(0.05523)	(0.01218)	(0.00986)	(0.01332)	(0.27919)
	[0.71866]	[-0.18015]	[0.42899]	[10.4684]	[0.78951]	[1.35001]	[-1.14556]	[-0.10797]
GDPSUP(-2)	0.049694	-0.901724	-0.008298	-0.062106	0.011312	0.002504	-0.002413	-0.020025
	(0.04953)	(0.49640)	(0.01921)	(0.04166)	(0.00916)	(0.00741)	(0.01002)	(0.20990)
	[1.00323]	[-1.81654]	[-0.43205]	[-1.49088]	[1.23552]	[0.33793]	[-0.24086]	[-0.09540]
FEDSUP(-1)	-0.048670	1.270345	-0.088331	0.137270	0.704375	0.018588	-0.064471	0.130642
	(0.26903)	(2.69588)	(0.10431)	(0.22456)	(0.04996)	(0.04025)	(0.05441)	(1.14007)
	[-0.18091]	[0.47122]	[-0.84682]	[0.61128]	[14.0987]	[0.46178]	[-1.18496]	[0.11459]
FEDSUP(-2)	0.127585	0.385541	-0.091835	0.207264	-0.033002	0.000880	-0.007143	-0.818352
	(0.21798)	(2.18428)	(0.08452)	(0.18195)	(0.04059)	(0.03261)	(0.04408)	(0.92367)
	[0.58531]	[0.17651]	[-1.08658]	[1.13915]	[-0.81302]	[0.02700]	[-0.16203]	[-0.88597]
REPOSUP(-1)	-0.129116	-2.427195	-0.066467	0.360598	0.084634	0.421669	-0.026958	1.478963
	(0.41301)	(4.13889)	(0.16015)	(0.34476)	(0.07635)	(0.06208)	(0.08353)	(1.75019)
	[-0.31262]	[-0.58644]	[-0.41504]	[1.04594]	[1.10857]	[6.79224]	[-0.32272]	[0.84503]
REPOSUP(-2)	0.069670	-2.182343	-0.132222	-0.103612	-0.021915	0.064968	-0.015699	-1.496894
	(0.28660)	(2.87191)	(0.11112)	(0.23922)	(0.05298)	(0.04322)	(0.05796)	(1.21447)
	[0.24310]	[-0.75989]	[-1.18988]	[-0.43312]	[-0.41368]	[1.50319]	[-0.27085]	[-1.23255]
CPISUP(-1)	0.279906	5.997787	0.176144	0.156583	0.038292	0.038719	0.259738	-1.028042
	(0.33606)	(3.36786)	(0.13031)	(0.28051)	(0.06212)	(0.05028)	(0.06830)	(1.42403)
	[0.83291]	[1.78089]	[1.35175]	[0.55820]	[0.61644]	[0.77005]	[3.80311]	[-0.72193]
CPISUP(-2)	0.005499	1.391380	0.018951	-0.035830	0.036463	0.030396	0.004562	-0.297367
	(0.21715)	(2.17599)	(0.08420)	(0.18125)	(0.04014)	(0.03249)	(0.04427)	(0.92016)
	[0.02533]	[0.63942]	[0.22508]	[-0.19769]	[0.90845]	[0.93557]	[0.10306]	[-0.32317]
RET_JSE(-1)	-0.001431	0.039018	0.005121	0.017558	0.004866	-0.000633	0.004035	-0.046131
	(0.01673)	(0.16765)	(0.00649)	(0.01396)	(0.00309)	(0.00250)	(0.00338)	(0.07126)
	[-0.08554]	[0.23274]	[0.78924]	[1.25736]	[1.57345]	[-0.25286]	[1.19259]	[-0.64737]
RET_JSE(-2)	0.005142	-0.044460	0.004993	0.005225	0.000857	-6.70E-05	0.000491	0.026084
	(0.01046)	(0.10478)	(0.00405)	(0.00873)	(0.00193)	(0.00156)	(0.00211)	(0.04467)
	[0.49172]	[-0.42430]	[1.23145]	[0.59864]	[0.44330]	[-0.04281]	[0.23199]	[0.58394]
C	-0.000154	-0.005316	-0.000533	-0.000105	-0.000468	-1.54E-06	-0.000136	0.007540
	(0.00110)	(0.01098)	(0.00042)	(0.00091)	(0.00020)	(0.00016)	(0.00022)	(0.00464)
	[-0.14037]	[-0.48404]	[-1.25450]	[-0.11465]	[-2.30876]	[-0.00937]	[-0.61221]	[1.62325]
R-squared	0.686527	0.566892	0.234985	0.572877	0.726557	0.527478	0.305613	0.086703
Adj. R-squared	0.635348	0.496181	0.110085	0.503143	0.681913	0.450331	0.192243	-0.062407
Sum sq. resids	0.019175	1.757672	0.001803	0.012621	0.000612	0.000293	0.000532	0.234237
S.E. equation	0.013988	0.133923	0.004290	0.011349	0.002499	0.001728	0.002329	0.048889
F-statistic	13.41417	8.016978	1.881379	8.215139	16.27456	6.837353	2.695727	0.581472
Mean dependent	-0.000762	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.023164	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 43: BVAR estimates – Investec Ltd

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETINVESTEC_LTD	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETINVESTEC_LTD(-1)	0.526211	0.008641	-0.019777	-0.023842	-0.003524	-0.006122	0.006992	-0.093360
	(0.05705)	(0.44757)	(0.01732)	(0.03728)	(0.00826)	(0.00668)	(0.00903)	(0.18926)
	[9.22365]	[0.01931]	[-1.14197]	[-0.63947]	[-0.42687]	[-0.91607]	[0.77408]	[-0.49328]
RETINVESTEC_LTD(-2)	-0.060634	-0.276523	-0.000138	0.012648	-0.013105	-0.000554	0.002143	-0.085576
	(0.04167)	(0.32585)	(0.01261)	(0.02714)	(0.00601)	(0.00487)	(0.00658)	(0.13779)
	[-1.45526]	[-0.84862]	[-0.01096]	[0.46601]	[-2.18014]	[-0.11390]	[0.32582]	[-0.62105]
DCA(-1)	-0.003324	0.565737	-0.000728	0.004128	0.000508	-0.001076	-0.001177	0.003062
	(0.00700)	(0.05542)	(0.00214)	(0.00460)	(0.00102)	(0.00082)	(0.00111)	(0.02333)
	[-0.47471]	[10.2085]	[-0.34114]	[0.89800]	[0.49915]	[-1.30545]	[-1.05710]	[0.13121]
DCA(-2)	-0.003391	-0.059582	-0.000148	-0.002779	0.000396	-0.000232	-0.000721	0.008597
	(0.00525)	(0.04166)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01749)
	[-0.64627]	[-1.43019]	[-0.09273]	[-0.80677]	[0.51918]	[-0.37619]	[-0.86426]	[0.49167]
LOGOIL(-1)	-0.098447	0.739493	0.091185	0.162593	0.006210	0.055063	0.022796	0.060033
	(0.23498)	(1.85146)	(0.07202)	(0.15422)	(0.03415)	(0.02764)	(0.03737)	(0.78320)
	[-0.41896]	[0.39941]	[1.26617]	[1.05430]	[0.18182]	[1.99187]	[0.60999]	[0.07665]
LOGOIL(-2)	0.089356	-0.133735	0.027135	0.004324	0.019469	0.013970	-0.000945	0.243327
	(0.14544)	(1.14596)	(0.04470)	(0.09545)	(0.02114)	(0.01711)	(0.02313)	(0.48463)
	[0.61440]	[-0.11670]	[0.60705]	[0.04530]	[0.92102]	[0.81648]	[-0.04086]	[0.50209]
GDPSUP(-1)	0.094132	-0.127613	0.007713	0.575162	0.008685	0.012383	-0.014386	-0.051742
	(0.08416)	(0.66318)	(0.02566)	(0.05548)	(0.01223)	(0.00990)	(0.01338)	(0.28042)
	[1.11852]	[-0.19243]	[0.30061]	[10.3674]	[0.71004]	[1.25060]	[-1.07492]	[-0.18452]
GDPSUP(-2)	0.128374	-0.913907	-0.005575	-0.059436	0.010837	0.003041	-0.002291	-0.002329
	(0.06318)	(0.49786)	(0.01926)	(0.04178)	(0.00918)	(0.00743)	(0.01005)	(0.21052)
	[2.03184]	[-1.83566]	[-0.28943]	[-1.42248]	[1.18014]	[0.40909]	[-0.22805]	[-0.01106]
FEDSUP(-1)	0.544281	1.414961	-0.072480	0.163978	0.712241	0.025063	-0.074747	0.170262
	(0.34788)	(2.74075)	(0.10604)	(0.22829)	(0.05079)	(0.04092)	(0.05531)	(1.15904)
	[1.56458]	[0.51627]	[-0.68348]	[0.71828]	[14.0225]	[0.61246]	[-1.35134]	[0.14690]
FEDSUP(-2)	-0.269702	0.579163	-0.084999	0.200130	-0.022057	0.002629	-0.008833	-0.688868
	(0.27936)	(2.20100)	(0.08516)	(0.18334)	(0.04091)	(0.03286)	(0.04442)	(0.93075)
	[-0.96544]	[0.26314]	[-0.99806]	[1.09158]	[-0.53919]	[0.08001]	[-0.19883]	[-0.74012]
REPOSUP(-1)	0.990662	-2.592901	-0.040395	0.390364	0.084435	0.429057	-0.034312	1.600290
	(0.52945)	(4.17173)	(0.16142)	(0.34750)	(0.07695)	(0.06257)	(0.08420)	(1.76408)

	[1.87111]	[-0.62154]	[-0.25025]	[1.12336]	[1.09727]	[6.85678]	[-0.40752]	[0.90715]
REPOSUP(-2)	0.390942	-1.950816	-0.116207	-0.094605	-0.008377	0.070356	-0.022765	-1.350773
	(0.36729)	(2.89402)	(0.11198)	(0.24106)	(0.05338)	(0.04356)	(0.05841)	(1.22382)
	[1.06439]	[-0.67409]	[-1.03778]	[-0.39245]	[-0.15692]	[1.61529]	[-0.38977]	[-1.10373]
CPISUP(-1)	-0.252853	5.859014	0.190781	0.148096	0.033896	0.038546	0.269741	-0.804368
	(0.42487)	(3.34813)	(0.12954)	(0.27886)	(0.06175)	(0.04999)	(0.06789)	(1.41567)
	[-0.59513]	[1.74994]	[1.47271]	[0.53107]	[0.54889]	[0.77115]	[3.97303]	[-0.56819]
CPISUP(-2)	-0.004747	1.221338	0.021158	-0.037720	0.029708	0.029400	0.009176	-0.267288
	(0.27583)	(2.17345)	(0.08410)	(0.18104)	(0.04009)	(0.03245)	(0.04422)	(0.91909)
	[-0.01721]	[0.56193]	[0.25159]	[-0.20835]	[0.74102]	[0.90597]	[0.20753]	[-0.29082]
RET_JSE(-1)	-0.007920	0.028699	0.005149	0.017450	0.004420	-0.000714	0.004312	-0.045586
	(0.02127)	(0.16763)	(0.00649)	(0.01396)	(0.00309)	(0.00250)	(0.00338)	(0.07125)
	[-0.37231]	[0.17121]	[0.79355]	[1.24977]	[1.42960]	[-0.28512]	[1.27448]	[-0.63979]
RET_JSE(-2)	-0.000742	-0.048601	0.004948	0.005161	0.000701	-0.000100	0.000562	0.025649
	(0.01330)	(0.10481)	(0.00406)	(0.00873)	(0.00193)	(0.00156)	(0.00212)	(0.04468)
	[-0.05580]	[-0.46371]	[1.21997]	[0.59116]	[0.36250]	[-0.06420]	[0.26589]	[0.57409]
C	0.000655	-0.004638	-0.000532	-8.11E-05	-0.000439	5.87E-06	-0.000159	0.007439
	(0.00139)	(0.01098)	(0.00042)	(0.00091)	(0.00020)	(0.00016)	(0.00022)	(0.00464)
	[0.47014]	[-0.42234]	[-1.25275]	[-0.08864]	[-2.16913]	[0.03582]	[-0.71537]	[1.60159]
R-squared	0.600738	0.564855	0.229301	0.573682	0.740084	0.534682	0.304685	0.080333
Adj. R-squared	0.535553	0.493811	0.103472	0.504079	0.697649	0.458712	0.191164	-0.069817
Sum sq. resids	0.026696	1.765940	0.001817	0.012598	0.000582	0.000288	0.000532	0.235871
S.E. equation	0.016505	0.134238	0.004306	0.011338	0.002437	0.001715	0.002331	0.049060
F-statistic	9.215823	7.950766	1.822329	8.242195	17.44031	7.038050	2.683952	0.535020
Mean dependent	-0.000183	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.024218	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 44: BVAR estimates – Investec PLC

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETIVESTEC_PLCE	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETIVESTEC_PLCE(-1)	0.469028	-0.055930	-0.008502	-0.033169	0.001572	0.008537	-0.019942	-0.159537
	(0.05901)	(0.39026)	(0.01510)	(0.03251)	(0.00720)	(0.00583)	(0.00788)	(0.16503)
	[7.94894]	[-0.14332]	[-0.56305]	[-1.02037]	[0.21830]	[1.46508]	[-2.53179]	[-0.96670]
RETIVESTEC_PLCE(-2)	-0.075562	-0.093077	-0.001874	-0.033857	0.009164	0.002199	-0.008010	0.053501

	(0.04242)	(0.27965)	(0.01082)	(0.02329)	(0.00516)	(0.00418)	(0.00564)	(0.11826)
	[-1.78114]	[-0.33283]	[-0.17317]	[-1.45345]	[1.77634]	[0.52673]	[-1.41902]	[0.45241]
DCA(-1)	-0.001077	0.569082	-0.000639	0.004801	0.000456	-0.001220	-0.000830	0.004840
	(0.00833)	(0.05559)	(0.00214)	(0.00461)	(0.00102)	(0.00083)	(0.00112)	(0.02341)
	[-0.12926]	[10.2374]	[-0.29849]	[1.04114]	[0.44664]	[-1.47618]	[-0.74316]	[0.20680]
DCA(-2)	-0.002925	-0.059044	-4.72E-05	-0.002474	0.000363	-0.000222	-0.000697	0.008817
	(0.00622)	(0.04164)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01748)
	[-0.47006]	[-1.41796]	[-0.02949]	[-0.71864]	[0.47573]	[-0.36040]	[-0.83613]	[0.50453]
LOGOIL(-1)	0.041756	0.907629	0.102635	0.174505	0.014418	0.057413	0.020853	0.168417
	(0.27661)	(1.83735)	(0.07146)	(0.15304)	(0.03389)	(0.02743)	(0.03709)	(0.77725)
	[0.15096]	[0.49399]	[1.43621]	[1.14022]	[0.42539]	[2.09280]	[0.56231]	[0.21668]
LOGOIL(-2)	-0.075234	-0.059525	0.031043	0.010124	0.022162	0.014407	-0.000729	0.282316
	(0.17214)	(1.14341)	(0.04460)	(0.09524)	(0.02109)	(0.01707)	(0.02308)	(0.48355)
	[-0.43706]	[-0.05206]	[0.69606]	[0.10630]	[1.05074]	[0.84386]	[-0.03161]	[0.58384]
GDPSUP(-1)	-0.080964	-0.137963	0.009956	0.569522	0.011890	0.014142	-0.018047	-0.028200
	(0.09976)	(0.66268)	(0.02564)	(0.05543)	(0.01222)	(0.00989)	(0.01337)	(0.28021)
	[-0.81160]	[-0.20819]	[0.38831]	[10.2740]	[0.97278]	[1.42933]	[-1.34955]	[-0.10064]
GDPSUP(-2)	-0.077327	-0.910702	-0.007997	-0.063336	0.010635	0.002808	-0.002478	-0.019024
	(0.07466)	(0.49594)	(0.01919)	(0.04162)	(0.00915)	(0.00740)	(0.01001)	(0.20970)
	[-1.03577]	[-1.83632]	[-0.41680]	[-1.52180]	[1.16263]	[0.37928]	[-0.24762]	[-0.09072]
FEDSUP(-1)	-0.976163	1.260338	-0.113019	0.052186	0.716443	0.036032	-0.110393	-0.220403
	(0.41995)	(2.78886)	(0.10791)	(0.23230)	(0.05168)	(0.04164)	(0.05628)	(1.17935)
	[-2.32450]	[0.45192]	[-1.04738]	[0.22465]	[13.8626]	[0.86527]	[-1.96135]	[-0.18689]
FEDSUP(-2)	0.318576	0.191750	-0.093380	0.155751	-0.022853	0.006083	-0.021072	-0.760597
	(0.33253)	(2.20849)	(0.08545)	(0.18396)	(0.04105)	(0.03297)	(0.04457)	(0.93392)
	[0.95804]	[0.08682]	[-1.09276]	[0.84664]	[-0.55674]	[0.18449]	[-0.47275]	[-0.81442]
REPOSUP(-1)	0.294805	-2.329206	-0.050534	0.447689	0.067703	0.409620	0.006736	1.606527
	(0.62722)	(4.16635)	(0.16121)	(0.34705)	(0.07685)	(0.06249)	(0.08409)	(1.76178)
	[0.47002]	[-0.55905]	[-0.31348]	[1.29000]	[0.88095]	[6.55450]	[0.08010]	[0.91188]
REPOSUP(-2)	-0.072323	-2.145017	-0.130929	-0.092597	-0.023992	0.063229	-0.010995	-1.485600
	(0.43244)	(2.87251)	(0.11115)	(0.23927)	(0.05299)	(0.04323)	(0.05797)	(1.21472)
	[-0.16724]	[-0.74674]	[-1.17799]	[-0.38700]	[-0.45281]	[1.46266]	[-0.18966]	[-1.22299]
CPISUP(-1)	1.065581	5.588059	0.193666	0.121589	0.039983	0.038269	0.267154	-0.690107
	(0.50892)	(3.38028)	(0.13079)	(0.28154)	(0.06235)	(0.05047)	(0.06855)	(1.42929)
	[2.09381]	[1.65314]	[1.48075]	[0.43187]	[0.64130]	[0.75830]	[3.89712]	[-0.48283]

CPISUP(-2)	0.388914	1.348480	0.031187	0.001419	0.027394	0.024339	0.023873	-0.160272
	(0.32887)	(2.18448)	(0.08452)	(0.18196)	(0.04029)	(0.03262)	(0.04444)	(0.92375)
	[1.18258]	[0.61730]	[0.36897]	[0.00780]	[0.67984]	[0.74622]	[0.53715]	[-0.17350]
RET_JSE(-1)	-0.022611	0.029721	0.005099	0.015948	0.004860	-0.000289	0.003370	-0.047805
	(0.02529)	(0.16801)	(0.00650)	(0.01399)	(0.00310)	(0.00251)	(0.00339)	(0.07141)
	[-0.89397]	[0.17690]	[0.78418]	[1.13962]	[1.56817]	[-0.11540]	[0.99391]	[-0.66941]
RET_JSE(-2)	0.000910	-0.048240	0.004963	0.004530	0.000917	6.96E-05	0.000184	0.025400
	(0.01579)	(0.10487)	(0.00406)	(0.00873)	(0.00193)	(0.00157)	(0.00212)	(0.04470)
	[0.05766]	[-0.46002]	[1.22302]	[0.51858]	[0.47401]	[0.04443]	[0.08689]	[0.56818]
C	-0.000106	-0.004967	-0.000574	-0.000193	-0.000438	1.17E-05	-0.000185	0.007103
	(0.00165)	(0.01098)	(0.00042)	(0.00091)	(0.00020)	(0.00016)	(0.00022)	(0.00464)
	[-0.06424]	[-0.45235]	[-1.35037]	[-0.21149]	[-2.16472]	[0.07110]	[-0.83521]	[1.52965]
R-squared	0.524143	0.562430	0.226347	0.587997	0.734927	0.540182	0.402531	0.083566
Adj. R-squared	0.446452	0.490990	0.100036	0.520731	0.691650	0.465110	0.304985	-0.066056
Sum sq. resids	0.038970	1.775780	0.001824	0.012175	0.000593	0.000285	0.000457	0.235042
S.E. equation	0.019941	0.134611	0.004314	0.011146	0.002461	0.001705	0.002161	0.048973
F-statistic	6.746522	7.872768	1.791982	8.741383	16.98184	7.195493	4.126584	0.558517
Mean dependent	0.001157	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.026803	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 45: BVAR estimates – MTN Group Ltd

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETMTN_GRP_LTD	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETMTN_GRP_LTD(-1)	0.685746	-0.108001	0.002280	-0.026926	-0.011716	0.006726	0.014743	0.095596
	(0.05084)	(0.58416)	(0.02260)	(0.04867)	(0.01078)	(0.00872)	(0.01179)	(0.24703)
	[13.4873]	[-0.18488]	[0.10087]	[-0.55329]	[-1.08723]	[0.77112]	[1.25051]	[0.38699]
RETMTN_GRP_LTD(-2)	-0.023979	-0.405115	0.011319	0.037916	-0.011429	0.000457	0.005946	0.032711
	(0.04110)	(0.47087)	(0.01822)	(0.03922)	(0.00869)	(0.00703)	(0.00950)	(0.19912)
	[-0.58345]	[-0.86035]	[0.62127]	[0.96666]	[-1.31580]	[0.06502]	[0.62562]	[0.16428]

DCA(-1)	0.000497	0.563947	-0.000676	0.004273	0.000469	-0.001073	-0.001108	0.003736
	(0.00478)	(0.05547)	(0.00214)	(0.00460)	(0.00102)	(0.00082)	(0.00111)	(0.02336)
	[0.10383]	[10.1666]	[-0.31652]	[0.92874]	[0.46062]	[-1.30154]	[-0.99424]	[0.15996]
DCA(-2)	-0.000754	-0.058812	-8.33E-05	-0.002750	0.000434	-0.000206	-0.000762	0.008960
	(0.00358)	(0.04162)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01747)
	[-0.21071]	[-1.41294]	[-0.05209]	[-0.79895]	[0.56950]	[-0.33405]	[-0.91442]	[0.51287]
LOGOIL(-1)	-0.237752	0.819507	0.103362	0.162587	0.010637	0.060735	0.023283	0.190645
	(0.15977)	(1.84444)	(0.07174)	(0.15363)	(0.03402)	(0.02754)	(0.03723)	(0.78025)
	[-1.48809]	[0.44431]	[1.44078]	[1.05827]	[0.31263]	[2.20537]	[0.62540]	[0.24434]
LOGOIL(-2)	-0.057223	-0.169629	0.033018	0.006149	0.018348	0.016674	0.001832	0.305565
	(0.09946)	(1.14823)	(0.04479)	(0.09564)	(0.02118)	(0.01714)	(0.02317)	(0.48559)
	[-0.57533]	[-0.14773]	[0.73719]	[0.06429]	[0.86630]	[0.97255]	[0.07906]	[0.62927]
GDPSUP(-1)	0.073060	-0.152650	0.011602	0.575363	0.007341	0.014488	-0.012779	-0.015964
	(0.05769)	(0.66602)	(0.02577)	(0.05572)	(0.01228)	(0.00994)	(0.01344)	(0.28162)
	[1.26646]	[-0.22920]	[0.45025]	[10.3263]	[0.59753]	[1.45694]	[-0.95083]	[-0.05669]
GDPSUP(-2)	0.109989	-0.914729	-0.007384	-0.058246	0.011271	0.001842	-0.002685	-0.017935
	(0.04327)	(0.49958)	(0.01933)	(0.04193)	(0.00921)	(0.00746)	(0.01008)	(0.21124)
	[2.54165]	[-1.83101]	[-0.38202]	[-1.38913]	[1.22315]	[0.24696]	[-0.26635]	[-0.08490]
FEDSUP(-1)	0.201800	1.140167	-0.087499	0.155817	0.698368	0.019631	-0.059948	0.102041
	(0.23425)	(2.70422)	(0.10463)	(0.22526)	(0.05012)	(0.04038)	(0.05458)	(1.14360)
	[0.86147]	[0.42162]	[-0.83625]	[0.69173]	[13.9348]	[0.48618]	[-1.09842]	[0.08923]
FEDSUP(-2)	0.138344	0.563655	-0.095070	0.201519	-0.024256	-0.002192	-0.014908	-0.842938
	(0.19012)	(2.19480)	(0.08492)	(0.18282)	(0.04079)	(0.03277)	(0.04430)	(0.92813)
	[0.72768]	[0.25681]	[-1.11947]	[1.10225]	[-0.59465]	[-0.06690]	[-0.33655]	[-0.90822]
REPOSUP(-1)	0.175237	-2.068236	-0.074794	0.351705	0.103948	0.415718	-0.045631	1.396167
	(0.36056)	(4.16264)	(0.16107)	(0.34674)	(0.07678)	(0.06244)	(0.08401)	(1.76024)
	[0.48602]	[-0.49686]	[-0.46436]	[1.01432]	[1.35377]	[6.65811]	[-0.54314]	[0.79317]
REPOSUP(-2)	0.137867	-2.007729	-0.136769	-0.106864	-0.014579	0.062465	-0.021981	-1.538786
	(0.24915)	(2.87641)	(0.11130)	(0.23960)	(0.05306)	(0.04329)	(0.05805)	(1.21637)
	[0.55334]	[-0.69800]	[-1.22888]	[-0.44602]	[-0.27478]	[1.44302]	[-0.37865]	[-1.26506]
CPISUP(-1)	-0.293139	6.117357	0.181171	0.124870	0.039991	0.037285	0.261932	-0.890855
	(0.29168)	(3.36746)	(0.13029)	(0.28047)	(0.06211)	(0.05027)	(0.06829)	(1.42383)
	[-1.00500]	[1.81661]	[1.39052]	[0.44522]	[0.64388]	[0.74163]	[3.83568]	[-0.62567]

CPISUP(-2)	-0.087978	1.189455	0.027078	-0.036111	0.028566	0.032247	0.011574	-0.207983
	(0.18835)	(2.17450)	(0.08414)	(0.18112)	(0.04011)	(0.03247)	(0.04424)	(0.91952)
	[-0.46710]	[0.54700]	[0.32183]	[-0.19937]	[0.71220]	[0.99322]	[0.26164]	[-0.22619]
RET_JSE(-1)	-0.007504	0.039686	0.005246	0.017474	0.004989	-0.000720	0.003897	-0.044679
	(0.01452)	(0.16765)	(0.00649)	(0.01396)	(0.00309)	(0.00250)	(0.00338)	(0.07126)
	[-0.51673]	[0.23672]	[0.80850]	[1.25133]	[1.61340]	[-0.28760]	[1.15162]	[-0.62698]
RET_JSE(-2)	0.001966	-0.044935	0.005034	0.005085	0.000871	-5.97E-05	0.000467	0.026722
	(0.00908)	(0.10478)	(0.00405)	(0.00873)	(0.00193)	(0.00156)	(0.00211)	(0.04467)
	[0.21665]	[-0.42885]	[1.24147]	[0.58265]	[0.45075]	[-0.03814]	[0.22095]	[0.59824]
C	0.002002	-0.003011	-0.000606	-0.000124	-0.000367	-3.14E-05	-0.000226	0.006771
	(0.00096)	(0.01114)	(0.00043)	(0.00093)	(0.00021)	(0.00017)	(0.00022)	(0.00471)
	[2.07535]	[-0.27038]	[-1.40619]	[-0.13329]	[-1.78579]	[-0.18877]	[-1.00762]	[1.43738]
R-squared	0.742499	0.566139	0.229326	0.575933	0.734051	0.530259	0.323646	0.076849
Adj. R-squared	0.700458	0.495305	0.103501	0.506698	0.690631	0.453567	0.213220	-0.073870
Sum sq. resids	0.012482	1.760729	0.001817	0.012531	0.000595	0.000291	0.000518	0.236765
S.E. equation	0.011286	0.134040	0.004306	0.011308	0.002465	0.001723	0.002299	0.049152
F-statistic	17.66134	7.992429	1.822587	8.318481	16.90572	6.914105	2.930904	0.509882
Mean dependent	0.003994	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.020621	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 46: BVAR estimates – Naspers Ltd

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETNASPERS__LTD	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETNASPERS__LTD(-1)	0.637145	-0.398014	-0.025578	-0.011369	-0.009264	0.002604	0.003795	-0.098287
	(0.05358)	(0.50263)	(0.01945)	(0.04187)	(0.00927)	(0.00750)	(0.01014)	(0.21253)
	[11.8911]	[-0.79186]	[-1.31522]	[-0.27153]	[-0.99932]	[0.34699]	[0.37413]	[-0.46245]
RETNASPERS__LTD(-2)	-0.036575	0.047499	0.001873	0.037147	-0.008396	0.000562	0.002802	-0.037957
	(0.04125)	(0.38576)	(0.01493)	(0.03213)	(0.00712)	(0.00576)	(0.00779)	(0.16313)
	[-0.88672]	[0.12313]	[0.12545]	[1.15597]	[-1.17989]	[0.09758]	[0.35991]	[-0.23268]
DCA(-1)	-0.011077	0.560166	-0.001247	0.004339	0.000266	-0.001026	-0.001057	0.000837

	(0.00592)	(0.05604)	(0.00216)	(0.00465)	(0.00103)	(0.00083)	(0.00113)	(0.02360)
	[-1.87039]	[9.99586]	[-0.57777]	[0.93341]	[0.25827]	[-1.23095]	[-0.93888]	[0.03546]
DCA(-2)	-0.001794	-0.063035	-0.000294	-0.002395	0.000233	-0.000174	-0.000685	0.007645
	(0.00441)	(0.04187)	(0.00161)	(0.00346)	(0.00077)	(0.00062)	(0.00084)	(0.01757)
	[-0.40672]	[-1.50549]	[-0.18300]	[-0.69192]	[0.30390]	[-0.28037]	[-0.81668]	[0.43507]
LOGOIL(-1)	-0.147593	0.664176	0.086042	0.181722	0.004700	0.060524	0.022026	0.071819
	(0.19728)	(1.85901)	(0.07231)	(0.15485)	(0.03429)	(0.02776)	(0.03752)	(0.78640)
	[-0.74813]	[0.35727]	[1.18987]	[1.17355]	[0.13704]	[2.18051]	[0.58700]	[0.09133]
LOGOIL(-2)	0.063591	-0.144224	0.025273	0.013263	0.018675	0.015809	-0.000943	0.245989
	(0.12186)	(1.14830)	(0.04479)	(0.09565)	(0.02118)	(0.01715)	(0.02318)	(0.48562)
	[0.52184]	[-0.12560]	[0.56424]	[0.13867]	[0.88165]	[0.92202]	[-0.04070]	[0.50655]
GDPSUP(-1)	0.101302	-0.182019	0.006407	0.576735	0.008171	0.013780	-0.014862	-0.050687
	(0.07060)	(0.66529)	(0.02574)	(0.05566)	(0.01227)	(0.00993)	(0.01343)	(0.28132)
	[1.43490]	[-0.27359]	[0.24890]	[10.3621]	[0.66585]	[1.38725]	[-1.10694]	[-0.18018]
GDPSUP(-2)	0.135208	-0.868361	-0.005071	-0.058567	0.010989	0.002211	-0.001778	-0.003901
	(0.05302)	(0.49963)	(0.01933)	(0.04193)	(0.00922)	(0.00746)	(0.01008)	(0.21126)
	[2.55005]	[-1.73801]	[-0.26233]	[-1.39663]	[1.19248]	[0.29639]	[-0.17638]	[-0.01846]
FEDSUP(-1)	-0.074825	1.369756	-0.099586	0.161534	0.699861	0.019013	-0.063759	0.012153
	(0.28690)	(2.70343)	(0.10460)	(0.22519)	(0.05010)	(0.04037)	(0.05456)	(1.14326)
	[-0.26081]	[0.50667]	[-0.95204]	[0.71732]	[13.9690]	[0.47100]	[-1.16859]	[0.01063]
FEDSUP(-2)	-0.077220	0.315577	-0.089028	0.198764	-0.032911	0.000852	-0.006261	-0.775582
	(0.23187)	(2.18498)	(0.08454)	(0.18200)	(0.04061)	(0.03262)	(0.04410)	(0.92397)
	[-0.33303]	[0.14443]	[-1.05303]	[1.09208]	[-0.81050]	[0.02612]	[-0.14197]	[-0.83940]
REPOSUP(-1)	0.664260	-2.043240	-0.030356	0.346152	0.102032	0.418382	-0.034146	1.672485
	(0.44330)	(4.17733)	(0.16164)	(0.34797)	(0.07706)	(0.06266)	(0.08431)	(1.76647)
	[1.49845]	[-0.48913]	[-0.18780]	[0.99477]	[1.32412]	[6.67719]	[-0.40500]	[0.94679]
REPOSUP(-2)	0.366456	-1.919301	-0.115544	-0.119962	-0.009925	0.062585	-0.019827	-1.402619
	(0.30662)	(2.88935)	(0.11180)	(0.24067)	(0.05330)	(0.04348)	(0.05831)	(1.22185)
	[1.19515]	[-0.66427]	[-1.03353]	[-0.49844]	[-0.18622]	[1.43925]	[-0.34000]	[-1.14795]
CPISUP(-1)	-0.303103	5.632618	0.188972	0.131446	0.031646	0.038707	0.268719	-0.826978
	(0.35591)	(3.35415)	(0.12978)	(0.27936)	(0.06186)	(0.05008)	(0.06802)	(1.41823)
	[-0.85162]	[1.67930]	[1.45612]	[0.47052]	[0.51153]	[0.77297]	[3.95077]	[-0.58311]
CPISUP(-2)	-0.010090	1.217385	0.021516	-0.031719	0.030169	0.031154	0.008384	-0.253734
	(0.23058)	(2.17287)	(0.08407)	(0.18099)	(0.04008)	(0.03244)	(0.04420)	(0.91884)
	[-0.04376]	[0.56027]	[0.25592]	[-0.17526]	[0.75271]	[0.96028]	[0.18966]	[-0.27615]
RET_JSE(-1)	-0.017972	0.030615	0.005268	0.017761	0.004557	-0.000598	0.004225	-0.043832
	(0.01778)	(0.16754)	(0.00648)	(0.01396)	(0.00309)	(0.00250)	(0.00338)	(0.07121)
	[-1.01086]	[0.18273]	[0.81237]	[1.27275]	[1.47461]	[-0.23900]	[1.24957]	[-0.61552]
RET_JSE(-2)	0.000981	-0.049533	0.004900	0.005292	0.000715	-3.30E-05	0.000538	0.026014
	(0.01112)	(0.10482)	(0.00406)	(0.00873)	(0.00193)	(0.00156)	(0.00212)	(0.04468)
	[0.08817]	[-0.47257]	[1.20823]	[0.60614]	[0.36998]	[-0.02109]	[0.25455]	[0.58221]
C	0.000224	-0.004990	-0.000575	-6.67E-05	-0.000469	-3.68E-07	-0.000141	0.007146
	(0.00116)	(0.01098)	(0.00042)	(0.00091)	(0.00020)	(0.00016)	(0.00022)	(0.00464)
	[0.19249]	[-0.45462]	[-1.35344]	[-0.07291]	[-2.31550]	[-0.00225]	[-0.63874]	[1.53941]
R-squared	0.726458	0.560788	0.234871	0.579003	0.729552	0.526227	0.297590	0.074871

Adj. R-squared	0.681798	0.489080	0.109952	0.510269	0.685397	0.448876	0.182911	-0.076170
Sum sq. resids	0.017903	1.782445	0.001804	0.012440	0.000605	0.000293	0.000538	0.237272
S.E. equation	0.013516	0.134864	0.004290	0.011267	0.002485	0.001730	0.002343	0.049205
F-statistic	16.26641	7.820429	1.880182	8.423809	16.52259	6.803122	2.594984	0.495698
Mean dependent	-1.79E-06	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.023961	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 47: BVAR estimates – Nedbank Group Ltd

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETNEDBANK_GRP_LTD	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETNEDBANK_GRP_LTD(-1)	0.619555	-0.212564	-0.024287	-0.007814	-0.007396	-0.003052	0.012980	-0.181982
	(0.05410)	(0.47863)	(0.01852)	(0.03987)	(0.00883)	(0.00715)	(0.00966)	(0.20240)
	[11.4525]	[-0.44411]	[-1.31130]	[-0.19599]	[-0.83768]	[-0.42700]	[1.34372]	[-0.89911]
RETNEDBANK_GRP_LTD(-2)	-0.042479	-0.120688	0.000359	0.037241	-0.012802	-0.002343	0.002592	-0.117856
	(0.04154)	(0.36644)	(0.01418)	(0.03052)	(0.00676)	(0.00547)	(0.00740)	(0.15496)
	[-1.02249]	[-0.32935]	[0.02530]	[1.22004]	[-1.89389]	[-0.42816]	[0.35045]	[-0.76057]
DCA(-1)	-0.000539	0.563041	-0.001063	0.004424	0.000308	-0.001155	-0.000979	-0.000516
	(0.00624)	(0.05565)	(0.00214)	(0.00462)	(0.00102)	(0.00083)	(0.00112)	(0.02343)
	[-0.08647]	[10.1170]	[-0.49593]	[0.95824]	[0.30090]	[-1.39642]	[-0.87562]	[-0.02201]
DCA(-2)	0.001681	-0.060346	-8.92E-05	-0.002529	0.000350	-0.000219	-0.000726	0.008304
	(0.00465)	(0.04164)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01748)
	[0.36156]	[-1.44935]	[-0.05579]	[-0.73452]	[0.45964]	[-0.35495]	[-0.87019]	[0.47517]
LOGOIL(-1)	-0.174168	0.661526	0.084236	0.186416	0.001822	0.054815	0.028955	-0.050254
	(0.20960)	(1.86280)	(0.07246)	(0.15516)	(0.03436)	(0.02781)	(0.03760)	(0.78798)
	[-0.83097]	[0.35512]	[1.16250]	[1.20142]	[0.05303]	[1.97082]	[0.77011]	[-0.06378]
LOGOIL(-2)	0.074785	-0.172980	0.023505	0.015813	0.016563	0.013408	0.002017	0.185893
	(0.12949)	(1.15090)	(0.04489)	(0.09587)	(0.02123)	(0.01718)	(0.02323)	(0.48672)
	[0.57752]	[-0.15030]	[0.52355]	[0.16495]	[0.78020]	[0.78026]	[0.08686]	[0.38193]
GDPSUP(-1)	0.046898	-0.150413	0.006557	0.576398	0.008731	0.012838	-0.013360	-0.063231
	(0.07487)	(0.66546)	(0.02575)	(0.05567)	(0.01227)	(0.00994)	(0.01343)	(0.28138)
	[0.62640]	[-0.22603]	[0.25470]	[10.3537]	[0.71133]	[1.29214]	[-0.99483]	[-0.22472]
GDPSUP(-2)	0.120731	-0.901913	-0.005885	-0.059136	0.010360	0.002483	-0.002345	-0.005531
	(0.05603)	(0.49797)	(0.01927)	(0.04179)	(0.00919)	(0.00743)	(0.01005)	(0.21056)
	[2.15485]	[-1.81117]	[-0.30548]	[-1.41496]	[1.12792]	[0.33394]	[-0.23332]	[-0.02627]
FEDSUP(-1)	0.218772	1.393223	-0.090435	0.159830	0.702023	0.017223	-0.067633	0.028086
	(0.30441)	(2.70544)	(0.10468)	(0.22536)	(0.05014)	(0.04040)	(0.05460)	(1.14411)
	[0.71867]	[0.51497]	[-0.86392]	[0.70923]	[14.0016]	[0.42635]	[-1.23869]	[0.02455]

FEDSUP(-2)	-0.091540	0.428435	-0.084112	0.189975	-0.026859	0.002805	-0.009470	-0.688786
	(0.24633)	(2.18933)	(0.08471)	(0.18237)	(0.04069)	(0.03269)	(0.04419)	(0.92581)
	[-0.37161]	[0.19569]	[-0.99292]	[1.04172]	[-0.66013]	[0.08580]	[-0.21433]	[-0.74398]
REPOSUP(-1)	0.690783	-2.431671	-0.047797	0.375360	0.084247	0.423509	-0.034056	1.591835
	(0.46715)	(4.15209)	(0.16066)	(0.34586)	(0.07659)	(0.06228)	(0.08380)	(1.75577)
	[1.47871]	[-0.58565]	[-0.29751]	[1.08529]	[1.10000]	[6.80021]	[-0.40640]	[0.90663]
REPOSUP(-2)	0.430145	-1.972532	-0.117101	-0.117811	-0.010694	0.068034	-0.024944	-1.320086
	(0.32456)	(2.88470)	(0.11162)	(0.24029)	(0.05321)	(0.04341)	(0.05822)	(1.21988)
	[1.32530]	[-0.68379]	[-1.04914]	[-0.49029]	[-0.20097]	[1.56708]	[-0.42845]	[-1.08214]
CPISUP(-1)	-0.435645	5.767688	0.186910	0.121128	0.037146	0.040337	0.270742	-0.774111
	(0.37873)	(3.36617)	(0.13024)	(0.28036)	(0.06209)	(0.05026)	(0.06826)	(1.42331)
	[-1.15028]	[1.71343]	[1.43509]	[0.43204]	[0.59829]	[0.80264]	[3.96618]	[-0.54388]
CPISUP(-2)	-0.096972	1.164556	0.017155	-0.027147	0.026608	0.029008	0.012503	-0.327772
	(0.24487)	(2.17644)	(0.08421)	(0.18129)	(0.04015)	(0.03250)	(0.04428)	(0.92035)
	[-0.39601]	[0.53507]	[0.20371]	[-0.14975]	[0.66278]	[0.89267]	[0.28237]	[-0.35614]
RET_JSE(-1)	-0.020346	0.024415	0.004875	0.018518	0.004122	-0.000761	0.004560	-0.050743
	(0.01889)	(0.16789)	(0.00650)	(0.01398)	(0.00310)	(0.00251)	(0.00339)	(0.07136)
	[-1.07713]	[0.14543]	[0.75022]	[1.32417]	[1.33102]	[-0.30344]	[1.34566]	[-0.71106]
RET_JSE(-2)	-0.002629	-0.051394	0.004731	0.005592	0.000546	-0.000129	0.000724	0.022663
	(0.01181)	(0.10495)	(0.00406)	(0.00874)	(0.00194)	(0.00157)	(0.00212)	(0.04474)
	[-0.22266]	[-0.48968]	[1.16497]	[0.63961]	[0.28183]	[-0.08246]	[0.34172]	[0.50652]
C	0.002902	-0.002808	-0.000411	-0.000260	-0.000336	2.87E-05	-0.000242	0.009030
	(0.00127)	(0.01128)	(0.00044)	(0.00094)	(0.00021)	(0.00017)	(0.00023)	(0.00477)
	[2.28548]	[-0.24879]	[-0.94160]	[-0.27684]	[-1.61599]	[0.17045]	[-1.06346]	[1.89182]
R-squared	0.670425	0.561632	0.232805	0.580444	0.736667	0.529566	0.321361	0.095888
Adj. R-squared	0.616616	0.490061	0.107549	0.511945	0.693674	0.452761	0.210563	-0.051722
Sum sq. resids	0.021674	1.779021	0.001809	0.012398	0.000589	0.000291	0.000520	0.231882
S.E. equation	0.014871	0.134734	0.004296	0.011248	0.002453	0.001724	0.002303	0.048643
F-statistic	12.45952	7.847267	1.858629	8.473777	17.13454	6.894897	2.900415	0.649601
Mean dependent	0.005588	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.024018	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 48: BVAR estimates – Netcare Ltd

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETNETCARE__LTD	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETNETCARE__LTD(-1)	0.618491	0.138257	-0.041249	-0.046437	-0.001549	-0.014542	-0.016298	-0.248994
	(0.05394)	(0.66305)	(0.02566)	(0.05523)	(0.01223)	(0.00990)	(0.01338)	(0.28040)
	[11.4670]	[0.20852]	[-1.60774]	[-0.84078]	[-0.12665]	[-1.46877]	[-1.21790]	[-0.88800]
RETNETCARE__LTD(-2)	-0.037961	0.251831	-0.012823	-0.000654	-0.011231	-0.006811	-0.006467	-0.165329
	(0.04164)	(0.51029)	(0.01974)	(0.04250)	(0.00941)	(0.00762)	(0.01030)	(0.21578)
	[-0.91160]	[0.49351]	[-0.64948]	[-0.01539]	[-1.19313]	[-0.89395]	[-0.62795]	[-0.76618]
DCA(-1)	-0.000102	0.566932	-0.000790	0.003951	0.000599	-0.001088	-0.001180	0.003425
	(0.00447)	(0.05539)	(0.00213)	(0.00459)	(0.00102)	(0.00082)	(0.00111)	(0.02332)
	[-0.02286]	[10.2350]	[-0.37036]	[0.85979]	[0.58882]	[-1.32063]	[-1.05957]	[0.14686]
DCA(-2)	0.002193	-0.058748	-9.91E-05	-0.002672	0.000376	-0.000226	-0.000771	0.008499
	(0.00335)	(0.04165)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01748)
	[0.65488]	[-1.41044]	[-0.06193]	[-0.77589]	[0.49271]	[-0.36647]	[-0.92458]	[0.48615]
LOGOIL(-1)	-0.046029	1.067361	0.076354	0.145599	0.009847	0.048740	0.007519	-0.031925
	(0.15058)	(1.85923)	(0.07232)	(0.15487)	(0.03430)	(0.02776)	(0.03753)	(0.78647)
	[-0.30568]	[0.57409]	[1.05576]	[0.94016]	[0.28712]	[1.75575]	[0.20036]	[-0.04059]
LOGOIL(-2)	0.021899	-0.013170	0.023474	-0.000146	0.021013	0.012297	-0.005489	0.222304
	(0.09283)	(1.14616)	(0.04471)	(0.09547)	(0.02114)	(0.01711)	(0.02313)	(0.48471)
	[0.23591]	[-0.01149]	[0.52505]	[-0.00152]	[0.99387]	[0.71853]	[-0.23730]	[0.45863]
GDPSUP(-1)	0.031811	-0.077920	0.004772	0.572644	0.008709	0.011047	-0.018000	-0.076846
	(0.05376)	(0.66383)	(0.02568)	(0.05553)	(0.01224)	(0.00991)	(0.01340)	(0.28069)
	[0.59175]	[-0.11738]	[0.18581]	[10.3122]	[0.71128]	[1.11453]	[-1.34366]	[-0.27377]
GDPSUP(-2)	0.041452	-0.904677	-0.007082	-0.061091	0.010365	0.002536	-0.001438	-0.010125
	(0.04018)	(0.49617)	(0.01920)	(0.04164)	(0.00915)	(0.00741)	(0.01001)	(0.20980)
	[1.03161]	[-1.82332]	[-0.36891]	[-1.46716]	[1.13258]	[0.34240]	[-0.14357]	[-0.04826]
FEDSUP(-1)	-0.070006	1.469254	-0.093616	0.141856	0.705600	0.018026	-0.066376	0.050582
	(0.21848)	(2.69767)	(0.10438)	(0.22471)	(0.04999)	(0.04028)	(0.05444)	(1.14082)
	[-0.32042]	[0.54464]	[-0.89689]	[0.63129]	[14.1135]	[0.44752]	[-1.21915]	[0.04434]
FEDSUP(-2)	-0.272471	0.366889	-0.101731	0.192814	-0.035432	-0.003567	-0.010700	-0.863105
	(0.17764)	(2.19331)	(0.08487)	(0.18270)	(0.04076)	(0.03275)	(0.04427)	(0.92750)
	[-1.53386]	[0.16728]	[-1.19869]	[1.05537]	[-0.86923]	[-0.10893]	[-0.24172]	[-0.93057]
REPOSUP(-1)	0.660247	-2.362493	-0.057672	0.378657	0.073841	0.421918	-0.026202	1.464732
	(0.33877)	(4.18250)	(0.16183)	(0.34839)	(0.07715)	(0.06274)	(0.08441)	(1.76862)
	[1.94897]	[-0.56485]	[-0.35637]	[1.08688]	[0.95713]	[6.72493]	[-0.31041]	[0.82818]
REPOSUP(-2)	0.078335	-2.368572	-0.106235	-0.081385	-0.015360	0.075451	-0.004187	-1.292466
	(0.23389)	(2.88798)	(0.11174)	(0.24056)	(0.05327)	(0.04347)	(0.05829)	(1.22127)

	[0.33492]	[-0.82015]	[-0.95071]	[-0.33832]	[-0.28834]	[1.73588]	[-0.07183]	[-1.05830]
CPISUP(-1)	0.008824	5.944290	0.162252	0.132449	0.018566	0.026573	0.257180	-1.085523
	(0.27219)	(3.36119)	(0.13005)	(0.27995)	(0.06199)	(0.05018)	(0.06816)	(1.42119)
	[0.03242]	[1.76851]	[1.24765]	[0.47312]	[0.29948]	[0.52954]	[3.77319]	[-0.76381]
CPISUP(-2)	0.105186	1.308064	0.021725	-0.037272	0.031196	0.029220	0.005895	-0.265479
	(0.17596)	(2.17268)	(0.08407)	(0.18097)	(0.04008)	(0.03244)	(0.04420)	(0.91876)
	[0.59780]	[0.60205]	[0.25842]	[-0.20595]	[0.77841]	[0.90075]	[0.13338]	[-0.28895]
RET_JSE(-1)	-0.008517	0.040187	0.004172	0.016363	0.004476	-0.001096	0.003663	-0.051849
	(0.01362)	(0.16821)	(0.00651)	(0.01401)	(0.00310)	(0.00251)	(0.00339)	(0.07150)
	[-0.62516]	[0.23891]	[0.64079]	[1.16785]	[1.44254]	[-0.43652]	[1.07893]	[-0.72514]
RET_JSE(-2)	-0.012824	-0.043209	0.004615	0.004835	0.000699	-0.000242	0.000301	0.023189
	(0.00850)	(0.10491)	(0.00406)	(0.00874)	(0.00194)	(0.00157)	(0.00212)	(0.04472)
	[-1.50937]	[-0.41189]	[1.13684]	[0.55330]	[0.36112]	[-0.15430]	[0.14197]	[0.51851]
C	0.001540	-0.005897	-0.000392	4.49E-05	-0.000417	6.23E-05	-7.78E-05	0.008510
	(0.00090)	(0.01114)	(0.00043)	(0.00093)	(0.00021)	(0.00017)	(0.00022)	(0.00471)
	[1.70714]	[-0.52952]	[-0.91016]	[0.04836]	[-2.02789]	[0.37471]	[-0.34602]	[1.80657]
R-squared	0.640010	0.563680	0.257244	0.572742	0.725330	0.552459	0.315252	0.097632
Adj. R-squared	0.581236	0.492444	0.135977	0.502986	0.680486	0.479391	0.203457	-0.049694
Sum sq. resids	0.011421	1.770709	0.001751	0.012625	0.000615	0.000277	0.000524	0.231434
S.E. equation	0.010795	0.134419	0.004227	0.011350	0.002505	0.001682	0.002313	0.048596
F-statistic	10.88937	7.912856	2.121312	8.210615	16.17448	7.560891	2.819900	0.662694
Mean dependent	0.003560	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.016682	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 49: BVAR estimates – Old Mutual PLC

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETOLDMUTUAL_PLC	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETOLDMUTUAL_PLC(-1)	0.630332	0.998550	-0.031303	-0.021033	-0.005562	-0.011329	-0.007432	-0.082047
	(0.05496)	(0.46222)	(0.01788)	(0.03849)	(0.00852)	(0.00690)	(0.00933)	(0.19542)
	[11.4681]	[2.16033]	[-1.75046]	[-0.54642]	[-0.65251]	[-1.64190]	[-0.79677]	[-0.41985]
RETOLDMUTUAL_PLC(-2)	-0.068147	-0.193298	0.005036	-0.004577	0.001110	-0.004561	0.002677	0.086506
	(0.04159)	(0.34852)	(0.01348)	(0.02903)	(0.00643)	(0.00520)	(0.00703)	(0.14737)
	[-1.63874]	[-0.55463]	[0.37348]	[-0.15766]	[0.17265]	[-0.87651]	[0.38066]	[0.58700]
DCA(-1)	0.003509	0.533957	0.000296	0.004922	0.000759	-0.000539	-0.000959	0.004292
	(0.00681)	(0.05772)	(0.00222)	(0.00479)	(0.00106)	(0.00086)	(0.00116)	(0.02430)
	[0.51551]	[9.25124]	[0.13295]	[1.02817]	[0.71637]	[-0.62820]	[-0.82697]	[0.17663]

DCA(-2)	-0.006925	-0.055600	-0.000173	-0.002669	0.000391	-0.000180	-0.000794	0.007969
	(0.00492)	(0.04181)	(0.00161)	(0.00346)	(0.00077)	(0.00062)	(0.00084)	(0.01755)
	[-1.40884]	[-1.32971]	[-0.10758]	[-0.77197]	[0.51113]	[-0.29014]	[-0.94753]	[0.45411]
LOGOIL(-1)	-0.182859	1.551594	0.080081	0.148745	0.011827	0.047119	0.013799	0.143806
	(0.22111)	(1.86669)	(0.07261)	(0.15549)	(0.03443)	(0.02787)	(0.03768)	(0.78962)
	[-0.82702]	[0.83120]	[1.10284]	[0.95664]	[0.34346]	[1.69057]	[0.36626]	[0.18212]
LOGOIL(-2)	0.001406	0.089610	0.025002	-0.000509	0.022185	0.011433	-0.003421	0.284086
	(0.13597)	(1.14795)	(0.04478)	(0.09562)	(0.02118)	(0.01714)	(0.02317)	(0.48547)
	[0.01034]	[0.07806]	[0.55836]	[-0.00532]	[1.04768]	[0.66702]	[-0.14766]	[0.58518]
GDPSUP(-1)	0.033152	-0.035677	0.008098	0.575591	0.009410	0.011739	-0.016004	-0.032846
	(0.07837)	(0.66178)	(0.02560)	(0.05536)	(0.01221)	(0.00988)	(0.01335)	(0.27982)
	[0.42300]	[-0.05391]	[0.31631]	[10.3978]	[0.77095]	[1.18807]	[-1.19839]	[-0.11738]
GDPSUP(-2)	0.020203	-0.941699	-0.006584	-0.061367	0.010842	0.002825	-0.001368	-0.008411
	(0.05871)	(0.49576)	(0.01918)	(0.04160)	(0.00914)	(0.00740)	(0.01000)	(0.20963)
	[0.34409]	[-1.89952]	[-0.34328]	[-1.47506]	[1.18569]	[0.38163]	[-0.13676]	[-0.04012]
FEDSUP(-1)	0.060017	1.760766	-0.106217	0.126335	0.706324	0.011736	-0.068739	0.060202
	(0.31955)	(2.69798)	(0.10439)	(0.22474)	(0.05000)	(0.04028)	(0.05445)	(1.14094)
	[0.18782]	[0.65262]	[-1.01749]	[0.56215]	[14.1270]	[0.29132]	[-1.26242]	[0.05277]
FEDSUP(-2)	0.058442	0.320556	-0.088755	0.206419	-0.034973	0.000134	-0.005380	-0.775331
	(0.25862)	(2.18357)	(0.08449)	(0.18189)	(0.04058)	(0.03260)	(0.04407)	(0.92338)
	[0.22597]	[0.14680]	[-1.05048]	[1.13487]	[-0.86184]	[0.00412]	[-0.12207]	[-0.83967]
REPOSUP(-1)	-0.370105	-1.700075	-0.090533	0.326846	0.078495	0.399585	-0.030655	1.581504
	(0.49673)	(4.19363)	(0.16226)	(0.34932)	(0.07736)	(0.06291)	(0.08464)	(1.77338)
	[-0.74508]	[-0.40539]	[-0.55794]	[0.93566]	[1.01472]	[6.35195]	[-0.36218]	[0.89180]
REPOSUP(-2)	-0.104599	-2.060692	-0.136174	-0.107931	-0.022611	0.062082	-0.015847	-1.490710
	(0.34028)	(2.87297)	(0.11116)	(0.23931)	(0.05299)	(0.04324)	(0.05798)	(1.21492)
	[-0.30739]	[-0.71727]	[-1.22498]	[-0.45101]	[-0.42666]	[1.43589]	[-0.27330]	[-1.22700]
CPISUP(-1)	-0.502354	6.651293	0.162189	0.130578	0.021628	0.022596	0.264174	-0.863567
	(0.39974)	(3.37539)	(0.13059)	(0.28113)	(0.06225)	(0.05039)	(0.06845)	(1.42716)
	[-1.25670]	[1.97052]	[1.24198]	[0.46448]	[0.34742]	[0.44840]	[3.85955]	[-0.60510]
CPISUP(-2)	-0.007780	1.589970	0.014579	-0.045689	0.030973	0.024254	0.005512	-0.230730
	(0.25815)	(2.17961)	(0.08433)	(0.18155)	(0.04020)	(0.03254)	(0.04434)	(0.92168)
	[-0.03014]	[0.72947]	[0.17288]	[-0.25167]	[0.77039]	[0.74531]	[0.12430]	[-0.25034]
RET_JSE(-1)	-0.009175	0.055808	0.004722	0.017180	0.004550	-0.000817	0.003998	-0.045451
	(0.01989)	(0.16790)	(0.00650)	(0.01399)	(0.00310)	(0.00251)	(0.00339)	(0.07137)
	[-0.46135]	[0.33239]	[0.72665]	[1.22843]	[1.46910]	[-0.32580]	[1.17999]	[-0.63686]
RET_JSE(-2)	-0.012312	-0.041235	0.004905	0.005054	0.000786	-0.000169	0.000468	0.026998
	(0.01241)	(0.10481)	(0.00406)	(0.00873)	(0.00193)	(0.00156)	(0.00212)	(0.04468)
	[-0.99173]	[-0.39341]	[1.20936]	[0.57893]	[0.40658]	[-0.10782]	[0.22124]	[0.60423]
C	0.003512	-0.010090	-0.000387	5.57E-05	-0.000422	9.71E-05	-0.000115	0.007284
	(0.00134)	(0.01133)	(0.00044)	(0.00094)	(0.00021)	(0.00017)	(0.00023)	(0.00479)
	[2.61569]	[-0.89029]	[-0.88308]	[0.05900]	[-2.01949]	[0.57371]	[-0.50481]	[1.51956]

R-squared	0.607798	0.572121	0.247047	0.573030	0.721850	0.538826	0.297515	0.077560
Adj. R-squared	0.543765	0.502263	0.124116	0.503321	0.676437	0.463532	0.182824	-0.073042
Sum sq. resids	0.027048	1.736454	0.001775	0.012617	0.000623	0.000286	0.000538	0.236582
S.E. equation	0.016613	0.133112	0.004256	0.011346	0.002521	0.001707	0.002343	0.049134
F-statistic	9.491957	8.189778	2.009637	8.220272	15.89547	7.156309	2.594048	0.515000
Mean dependent	0.006992	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.024596	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 50: BVAR estimates – Remgro Ltd

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETREMGRO_LTD	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETREMGRO_LTD(-1)	0.591686	-0.011721	-0.005163	-0.028309	-0.012475	-0.001368	0.008377	0.049924
	(0.05559)	(0.73178)	(0.02831)	(0.06096)	(0.01350)	(0.01093)	(0.01477)	(0.30945)
	[10.6437]	[-0.01602]	[-0.18233]	[-0.46437]	[-0.92412]	[-0.12516]	[0.56716]	[0.16133]
RETREMGRO_LTD(-2)	-0.039060	-0.260884	-0.006948	0.062946	-0.024546	-0.002231	0.002000	-0.180324
	(0.04150)	(0.54474)	(0.02108)	(0.04538)	(0.01005)	(0.00813)	(0.01099)	(0.23036)
	[-0.94113]	[-0.47891]	[-0.32962]	[1.38718]	[-2.44255]	[-0.27427]	[0.18187]	[-0.78281]
DCA(-1)	0.000561	0.566094	-0.000809	0.004266	0.000444	-0.001098	-0.001155	0.002567
	(0.00417)	(0.05541)	(0.00213)	(0.00460)	(0.00102)	(0.00082)	(0.00111)	(0.02333)
	[0.13441]	[10.2161]	[-0.37891]	[0.92803]	[0.43621]	[-1.33248]	[-1.03686]	[0.11003]
DCA(-2)	5.97E-05	-0.059612	-6.04E-05	-0.002653	0.000416	-0.000205	-0.000756	0.008964
	(0.00312)	(0.04162)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01747)
	[0.01912]	[-1.43243]	[-0.03780]	[-0.77112]	[0.54641]	[-0.33258]	[-0.90697]	[0.51323]
LOGOIL(-1)	0.112618	0.831306	0.099087	0.177279	0.007840	0.057796	0.019816	0.124035
	(0.13920)	(1.84112)	(0.07161)	(0.15336)	(0.03396)	(0.02749)	(0.03716)	(0.77885)
	[0.80903]	[0.45152]	[1.38369]	[1.15598]	[0.23086]	[2.10246]	[0.53324]	[0.15926]
LOGOIL(-2)	0.103065	-0.099311	0.029439	0.010887	0.019988	0.014793	-0.002039	0.260730
	(0.08651)	(1.14422)	(0.04463)	(0.09531)	(0.02111)	(0.01708)	(0.02309)	(0.48390)
	[1.19135]	[-0.08679]	[0.65962]	[0.11423]	[0.94700]	[0.86585]	[-0.08829]	[0.53881]
GDPSUP(-1)	0.024283	-0.119615	0.009896	0.574662	0.007852	0.013117	-0.014331	-0.028105
	(0.05051)	(0.66801)	(0.02584)	(0.05588)	(0.01232)	(0.00997)	(0.01348)	(0.28246)
	[0.48079]	[-0.17906]	[0.38289]	[10.2830]	[0.63725]	[1.31510]	[-1.06312]	[-0.09950]
GDPSUP(-2)	0.080490	-0.920428	-0.007707	-0.057999	0.010069	0.002375	-0.001862	-0.020997
	(0.03764)	(0.49783)	(0.01926)	(0.04178)	(0.00918)	(0.00743)	(0.01005)	(0.21050)
	[2.13847]	[-1.84888]	[-0.40015]	[-1.38816]	[1.09652]	[0.31956]	[-0.18537]	[-0.09975]
FEDSUP(-1)	0.159109	1.322075	-0.096424	0.170835	0.702134	0.017546	-0.068522	-0.026151

	(0.20566)	(2.71971)	(0.10523)	(0.22654)	(0.05041)	(0.04061)	(0.05489)	(1.15014)
	[0.77366]	[0.48611]	[-0.91630]	[0.75409]	[13.9296]	[0.43207]	[-1.24838]	[-0.02274]
FEDSUP(-2)	-0.156562	0.444596	-0.085234	0.180393	-0.022852	0.002103	-0.006987	-0.705622
	(0.16600)	(2.19537)	(0.08495)	(0.18287)	(0.04080)	(0.03278)	(0.04431)	(0.92836)
	[-0.94317]	[0.20252]	[-1.00340]	[0.98646]	[-0.56007]	[0.06416]	[-0.15770]	[-0.76007]
REPOSUP(-1)	0.824607	-2.414636	-0.052936	0.375938	0.109281	0.424984	-0.039034	1.512395
	(0.32044)	(4.23775)	(0.16397)	(0.35300)	(0.07817)	(0.06357)	(0.08553)	(1.79200)
	[2.57336]	[-0.56979]	[-0.32284]	[1.06498]	[1.39803]	[6.68575]	[-0.45639]	[0.84397]
REPOSUP(-2)	0.177323	-1.958639	-0.123415	-0.133027	0.005919	0.067568	-0.022734	-1.391402
	(0.22020)	(2.91234)	(0.11269)	(0.24259)	(0.05372)	(0.04383)	(0.05878)	(1.23157)
	[0.80527]	[-0.67253]	[-1.09521]	[-0.54836]	[0.11018]	[1.54145]	[-0.38678]	[-1.12978]
CPISUP(-1)	-0.182751	5.753178	0.192653	0.136934	0.028504	0.038923	0.272152	-0.792581
	(0.25348)	(3.35291)	(0.12973)	(0.27926)	(0.06184)	(0.05006)	(0.06799)	(1.41770)
	[-0.72097]	[1.71587]	[1.48504]	[0.49035]	[0.46092]	[0.77758]	[4.00278]	[-0.55906]
CPISUP(-2)	0.014201	1.216170	0.022737	-0.028085	0.025716	0.030008	0.009318	-0.260133
	(0.16446)	(2.17530)	(0.08417)	(0.18119)	(0.04012)	(0.03248)	(0.04425)	(0.91987)
	[0.08635]	[0.55908]	[0.27013]	[-0.15500]	[0.64089]	[0.92394]	[0.21055]	[-0.28279]
RET_JSE(-1)	-0.002333	0.033249	0.005452	0.017646	0.004752	-0.000612	0.004143	-0.042949
	(0.01267)	(0.16753)	(0.00648)	(0.01395)	(0.00309)	(0.00250)	(0.00338)	(0.07121)
	[-0.18416]	[0.19846]	[0.84083]	[1.26452]	[1.53765]	[-0.24455]	[1.22536]	[-0.60313]
RET_JSE(-2)	-0.004080	-0.046384	0.005095	0.005161	0.000852	-5.13E-05	0.000495	0.027137
	(0.00792)	(0.10477)	(0.00405)	(0.00873)	(0.00193)	(0.00156)	(0.00211)	(0.04466)
	[-0.51513]	[-0.44274]	[1.25667]	[0.59144]	[0.44094]	[-0.03278]	[0.23390]	[0.60762]
C	0.000572	-0.004629	-0.000550	-0.000107	-0.000424	-1.33E-07	-0.000158	0.007299
	(0.00083)	(0.01099)	(0.00043)	(0.00092)	(0.00020)	(0.00016)	(0.00022)	(0.00465)
	[0.68771]	[-0.42109]	[-1.29315]	[-0.11694]	[-2.09243]	[-0.00081]	[-0.71424]	[1.56984]
R-squared	0.661577	0.562108	0.221324	0.581090	0.749313	0.528295	0.300291	0.078688
Adj. R-squared	0.606324	0.490615	0.094194	0.512697	0.708384	0.451282	0.186053	-0.071731
Sum sq. resids	0.009580	1.777088	0.001836	0.012379	0.000561	0.000292	0.000536	0.236293
S.E. equation	0.009887	0.134661	0.004328	0.011239	0.002393	0.001726	0.002338	0.049103
F-statistic	11.97365	7.862466	1.740920	8.496285	18.30782	6.859819	2.628639	0.523126
Mean dependent	0.000667	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.015758	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 51: BVAR estimates – RMB Holdings Ltd

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETRMB_HOLDING_LTD	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETRMB_HOLDING_LTD(-1)	0.678930	0.371218	-0.003533	0.036488	-0.002901	0.003383	0.004899	-0.069377
	(0.05074)	(0.50250)	(0.01944)	(0.04186)	(0.00927)	(0.00750)	(0.01014)	(0.21249)
	[13.3801]	[0.73874]	[-0.18172]	[0.87168]	[-0.31294]	[0.45083]	[0.48303]	[-0.32649]
RETRMB_HOLDING_LTD(-2)	-0.037460	-0.221939	0.002788	0.004933	-0.003261	-0.000981	0.003663	-0.013576
	(0.04024)	(0.39744)	(0.01538)	(0.03310)	(0.00733)	(0.00593)	(0.00802)	(0.16807)
	[-0.93093]	[-0.55842]	[0.18130]	[0.14901]	[-0.44488]	[-0.16533]	[0.45662]	[-0.08078]
DCA(-1)	-0.004591	0.566188	-0.000756	0.003985	0.000567	-0.001092	-0.001167	0.003375
	(0.00554)	(0.05539)	(0.00213)	(0.00459)	(0.00102)	(0.00082)	(0.00111)	(0.02332)
	[-0.82818]	[10.2215]	[-0.35446]	[0.86734]	[0.55736]	[-1.32643]	[-1.04823]	[0.14469]
DCA(-2)	-0.002429	-0.058167	-7.57E-05	-0.002550	0.000404	-0.000193	-0.000736	0.008778
	(0.00416)	(0.04166)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01748)
	[-0.58445]	[-1.39635]	[-0.04732]	[-0.74033]	[0.53011]	[-0.31311]	[-0.88240]	[0.50205]
LOGOIL(-1)	-0.069163	0.963915	0.101009	0.180551	0.013825	0.059407	0.020363	0.131338
	(0.18510)	(1.84172)	(0.07163)	(0.15341)	(0.03397)	(0.02750)	(0.03717)	(0.77910)
	[-0.37366]	[0.52338]	[1.41007]	[1.17692]	[0.40693]	[2.16034]	[0.54779]	[0.16858]
LOGOIL(-2)	0.045106	-0.047266	0.030304	0.013248	0.021821	0.015520	-0.000847	0.261973
	(0.11519)	(1.14618)	(0.04471)	(0.09547)	(0.02114)	(0.01711)	(0.02313)	(0.48473)
	[0.39157]	[-0.04124]	[0.67782]	[0.13877]	[1.03209]	[0.90689]	[-0.03663]	[0.54046]
GDPSUP(-1)	0.128871	-0.135749	0.010785	0.572315	0.010734	0.012998	-0.016765	-0.021820
	(0.06662)	(0.66298)	(0.02565)	(0.05546)	(0.01223)	(0.00990)	(0.01338)	(0.28033)
	[1.93428]	[-0.20475]	[0.42046]	[10.3203]	[0.87776]	[1.31316]	[-1.25307]	[-0.07783]
GDPSUP(-2)	0.075802	-0.939262	-0.007381	-0.067568	0.011350	0.002050	-0.002599	-7.06E-05
	(0.05012)	(0.49868)	(0.01929)	(0.04185)	(0.00920)	(0.00745)	(0.01006)	(0.21086)
	[1.51255]	[-1.88350]	[-0.38257]	[-1.61450]	[1.23397]	[0.27541]	[-0.25820]	[-0.00033]
FEDSUP(-1)	0.112456	1.445612	-0.095284	0.146435	0.706591	0.018516	-0.064509	0.042295
	(0.27075)	(2.69403)	(0.10424)	(0.22441)	(0.04993)	(0.04023)	(0.05437)	(1.13928)
	[0.41535]	[0.53660]	[-0.91410]	[0.65254]	[14.1529]	[0.46030]	[-1.18647]	[0.03712]
FEDSUP(-2)	0.126713	0.278533	-0.088321	0.201400	-0.034339	0.000521	-0.006566	-0.773339
	(0.21952)	(2.18423)	(0.08452)	(0.18194)	(0.04059)	(0.03261)	(0.04408)	(0.92365)
	[0.57723]	[0.12752]	[-1.04504]	[1.10694]	[-0.84597]	[0.01597]	[-0.14895]	[-0.83726]
REPOSUP(-1)	0.641883	-2.888904	-0.059622	0.307179	0.089336	0.418256	-0.036219	1.617983
	(0.41998)	(4.17884)	(0.16169)	(0.34808)	(0.07708)	(0.06268)	(0.08434)	(1.76709)
	[1.52837]	[-0.69132]	[-0.36873]	[0.88249]	[1.15896]	[6.67282]	[-0.42945]	[0.91562]
REPOSUP(-2)	0.152789	-2.272066	-0.132026	-0.134599	-0.017296	0.063070	-0.021799	-1.435178
	(0.29042)	(2.88973)	(0.11181)	(0.24070)	(0.05330)	(0.04349)	(0.05832)	(1.22201)

	[0.52609]	[-0.78626]	[-1.18079]	[-0.55919]	[-0.32448]	[1.45020]	[-0.37378]	[-1.17444]
CPISUP(-1)	-0.150398	5.839467	0.191093	0.161248	0.027613	0.039703	0.269669	-0.848774
	(0.33641)	(3.34769)	(0.12953)	(0.27883)	(0.06174)	(0.04998)	(0.06788)	(1.41548)
	[-0.44707]	[1.74433]	[1.47533]	[0.57831]	[0.44722]	[0.79440]	[3.97251]	[-0.59964]
CPISUP(-2)	0.017824	1.298759	0.024866	-0.027291	0.031548	0.031158	0.009091	-0.249866
	(0.21843)	(2.17343)	(0.08410)	(0.18103)	(0.04009)	(0.03245)	(0.04422)	(0.91907)
	[0.08160]	[0.59756]	[0.29568]	[-0.15075]	[0.78693]	[0.96015]	[0.20561]	[-0.27187]
RET_JSE(-1)	0.012199	0.031912	0.005440	0.017718	0.004641	-0.000620	0.004226	-0.043197
	(0.01684)	(0.16754)	(0.00648)	(0.01396)	(0.00309)	(0.00250)	(0.00338)	(0.07121)
	[0.72448]	[0.19048]	[0.83896]	[1.26965]	[1.50168]	[-0.24770]	[1.24972]	[-0.60660]
RET_JSE(-2)	0.007093	-0.048116	0.005100	0.005234	0.000802	-6.21E-05	0.000514	0.026892
	(0.01053)	(0.10479)	(0.00405)	(0.00873)	(0.00193)	(0.00156)	(0.00211)	(0.04467)
	[0.67349]	[-0.45918]	[1.25788]	[0.59965]	[0.41505]	[-0.03967]	[0.24312]	[0.60202]
C	0.002282	-0.005671	-0.000554	-0.000321	-0.000421	-1.59E-05	-0.000190	0.007688
	(0.00112)	(0.01118)	(0.00043)	(0.00093)	(0.00021)	(0.00017)	(0.00023)	(0.00473)
	[2.03104]	[-0.50721]	[-1.28116]	[-0.34412]	[-2.04166]	[-0.09530]	[-0.84409]	[1.62566]
R-squared	0.738152	0.564533	0.221050	0.576464	0.722825	0.525961	0.303475	0.072815
Adj. R-squared	0.695402	0.493436	0.093875	0.507315	0.677572	0.448567	0.189757	-0.078562
Sum sq. resids	0.017816	1.767247	0.001836	0.012515	0.000620	0.000294	0.000533	0.237799
S.E. equation	0.013483	0.134288	0.004329	0.011301	0.002516	0.001731	0.002333	0.049260
F-statistic	17.26648	7.940354	1.738153	8.336567	15.97296	6.795886	2.668656	0.481019
Mean dependent	0.005181	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.024430	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 52: BVAR estimates – SABMiller PLC

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETSABMILLER_PLC	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETSABMILLER_PLC(-1)	0.661806	-0.096348	-0.012174	-0.032551	-0.016023	-0.010853	-0.003423	-0.173673
	(0.05200)	(0.61485)	(0.02379)	(0.05122)	(0.01134)	(0.00918)	(0.01241)	(0.26000)
	[12.7277]	[-0.15670]	[-0.51175]	[-0.63557]	[-1.41281]	[-1.18224]	[-0.27586]	[-0.66797]
RETSABMILLER_PLC(-2)	-0.054516	-0.443108	-0.003279	0.011560	-0.019868	-0.003255	0.002730	-0.120432
	(0.04118)	(0.48546)	(0.01878)	(0.04044)	(0.00896)	(0.00725)	(0.00980)	(0.20528)
	[-1.32379]	[-0.91276]	[-0.17458]	[0.28588]	[-2.21860]	[-0.44908]	[0.27866]	[-0.58666]
DCA(-1)	0.002568	0.566267	-0.000720	0.004209	0.000587	-0.001042	-0.001148	0.003804
	(0.00466)	(0.05553)	(0.00214)	(0.00461)	(0.00102)	(0.00083)	(0.00112)	(0.02338)
	[0.55157]	[10.1983]	[-0.33654]	[0.91377]	[0.57524]	[-1.26281]	[-1.02871]	[0.16272]

DCA(-2)	0.000361	-0.058325	-4.76E-05	-0.002692	0.000474	-0.000192	-0.000758	0.009422
	(0.00348)	(0.04163)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01747)
	[0.10368]	[-1.40098]	[-0.02976]	[-0.78221]	[0.62227]	[-0.31075]	[-0.90864]	[0.53924]
LOGOIL(-1)	-0.068663	0.800269	0.098818	0.163896	0.009287	0.056065	0.017839	0.105868
	(0.15488)	(1.83953)	(0.07155)	(0.15323)	(0.03393)	(0.02747)	(0.03713)	(0.77816)
	[-0.44332]	[0.43504]	[1.38114]	[1.06964]	[0.27370]	[2.04126]	[0.48046]	[0.13605]
LOGOIL(-2)	0.021907	-0.107608	0.029368	0.003927	0.020683	0.014165	-0.002595	0.258761
	(0.09630)	(1.14368)	(0.04461)	(0.09526)	(0.02110)	(0.01708)	(0.02308)	(0.48367)
	[0.22749]	[-0.09409]	[0.65833]	[0.04122]	[0.98040]	[0.82953]	[-0.11242]	[0.53500]
GDPSUP(-1)	0.032686	-0.140475	0.009552	0.575877	0.007755	0.012305	-0.015722	-0.052646
	(0.05571)	(0.66174)	(0.02560)	(0.05536)	(0.01221)	(0.00988)	(0.01335)	(0.27981)
	[0.58670]	[-0.21228]	[0.37309]	[10.4033]	[0.63534]	[1.24542]	[-1.17735]	[-0.18815]
GDPSUP(-2)	0.040871	-0.910957	-0.007233	-0.060853	0.010975	0.002750	-0.001455	-0.006222
	(0.04177)	(0.49612)	(0.01919)	(0.04163)	(0.00915)	(0.00741)	(0.01001)	(0.20978)
	[0.97848]	[-1.83616]	[-0.37682]	[-1.46160]	[1.19937]	[0.37124]	[-0.14533]	[-0.02966]
FEDSUP(-1)	0.203402	1.145329	-0.096367	0.146757	0.696554	0.016820	-0.064633	-0.001053
	(0.22850)	(2.71350)	(0.10499)	(0.22603)	(0.05029)	(0.04052)	(0.05476)	(1.14751)
	[0.89018]	[0.42208]	[-0.91786]	[0.64929]	[13.8508]	[0.41514]	[-1.18023]	[-0.00092]
FEDSUP(-2)	-0.089756	0.530071	-0.085599	0.207039	-0.023980	0.003927	-0.006279	-0.708713
	(0.18447)	(2.19086)	(0.08477)	(0.18249)	(0.04072)	(0.03271)	(0.04422)	(0.92646)
	[-0.48656]	[0.24195]	[-1.00976]	[1.13449]	[-0.58894]	[0.12005]	[-0.14201]	[-0.76497]
REPOSUP(-1)	0.024506	-3.022168	-0.073370	0.352146	0.053650	0.412249	-0.026350	1.286269
	(0.35035)	(4.16104)	(0.16100)	(0.34660)	(0.07675)	(0.06242)	(0.08398)	(1.75957)
	[0.06995]	[-0.72630]	[-0.45571]	[1.01599]	[0.69899]	[6.60490]	[-0.31376]	[0.73101]
REPOSUP(-2)	0.151730	-2.174601	-0.131506	-0.100572	-0.021176	0.065705	-0.014927	-1.485596
	(0.24185)	(2.87248)	(0.11114)	(0.23927)	(0.05299)	(0.04323)	(0.05797)	(1.21471)
	[0.62736]	[-0.75705]	[-1.18320]	[-0.42033]	[-0.39965]	[1.51994]	[-0.25749]	[-1.22300]
CPISUP(-1)	-0.407175	5.511822	0.182189	0.134889	0.009079	0.029427	0.268255	-1.011420
	(0.28375)	(3.37026)	(0.13040)	(0.28071)	(0.06216)	(0.05032)	(0.06834)	(1.42503)
	[-1.43500]	[1.63543]	[1.39717]	[0.48054]	[0.14605]	[0.58484]	[3.92506]	[-0.70976]
CPISUP(-2)	-0.011753	1.093475	0.020060	-0.041956	0.021129	0.026162	0.007204	-0.328624
	(0.18350)	(2.17942)	(0.08433)	(0.18153)	(0.04020)	(0.03254)	(0.04434)	(0.92161)
	[-0.06405]	[0.50173]	[0.23788]	[-0.23112]	[0.52559]	[0.80399]	[0.16247]	[-0.35658]
RET_JSE(-1)	-0.002864	0.022950	0.005146	0.017218	0.004020	-0.000874	0.004170	-0.048303
	(0.01413)	(0.16782)	(0.00650)	(0.01398)	(0.00310)	(0.00251)	(0.00339)	(0.07133)
	[-0.20269]	[0.13675]	[0.79230]	[1.23176]	[1.29870]	[-0.34878]	[1.23127]	[-0.67714]
RET_JSE(-2)	0.001242	-0.049348	0.005023	0.005178	0.000657	-0.000111	0.000501	0.025643
	(0.00882)	(0.10479)	(0.00405)	(0.00873)	(0.00193)	(0.00156)	(0.00211)	(0.04467)
	[0.14077]	[-0.47092]	[1.23880]	[0.59321]	[0.33988]	[-0.07064]	[0.23691]	[0.57403]
C	0.002838	-0.001731	-0.000465	3.36E-05	-0.000242	8.32E-05	-0.000141	0.009017
	(0.00097)	(0.01149)	(0.00044)	(0.00096)	(0.00021)	(0.00017)	(0.00023)	(0.00486)
	[2.93211]	[-0.15063]	[-1.04584]	[0.03509]	[-1.13894]	[0.48471]	[-0.60898]	[1.85470]

R-squared	0.636296	0.566233	0.222839	0.573335	0.748380	0.534646	0.294486	0.087700
Adj. R-squared	0.576915	0.495414	0.095956	0.503675	0.707299	0.458670	0.179300	-0.061247
Sum sq. resids	0.013844	1.760349	0.001832	0.012608	0.000563	0.000288	0.000540	0.233982
S.E. equation	0.011886	0.134025	0.004324	0.011342	0.002397	0.001715	0.002348	0.048863
F-statistic	10.71560	7.995475	1.756253	8.230527	18.21723	7.037017	2.556611	0.588801
Mean dependent	0.006115	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.018273	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 53: BVAR estimates – Sanlam Ltd

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETSANLAM_LTD	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETSANLAM_LTD(-1)	0.641226	0.543922	-0.025515	-0.034800	-0.009934	-0.006762	0.010525	-0.054469
	(0.05273)	(0.67462)	(0.02610)	(0.05620)	(0.01244)	(0.01007)	(0.01361)	(0.28527)
	[12.1613]	[0.80626]	[-0.97745]	[-0.61921]	[-0.79829]	[-0.67134]	[0.77303]	[-0.19093]
RETSANLAM_LTD(-2)	-0.038951	-0.126786	0.013762	0.034522	-0.014711	-0.000517	0.001389	-0.021896
	(0.04111)	(0.52445)	(0.02029)	(0.04369)	(0.00967)	(0.00783)	(0.01058)	(0.22178)
	[-0.94737]	[-0.24175]	[0.67820]	[0.79023]	[-1.52064]	[-0.06602]	[0.13124]	[-0.09873]
DCA(-1)	0.000289	0.563711	-0.000642	0.004096	0.000732	-0.001030	-0.001265	0.003897
	(0.00430)	(0.05556)	(0.00214)	(0.00461)	(0.00102)	(0.00083)	(0.00112)	(0.02339)
	[0.06702]	[10.1460]	[-0.29978]	[0.88881]	[0.71687]	[-1.24644]	[-1.13280]	[0.16660]
DCA(-2)	-0.001239	-0.059335	-9.55E-05	-0.002767	0.000457	-0.000203	-0.000758	0.009090
	(0.00322)	(0.04164)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01748)
	[-0.38526]	[-1.42500]	[-0.05970]	[-0.80372]	[0.59959]	[-0.32829]	[-0.90912]	[0.52013]
LOGOIL(-1)	-0.117683	1.021264	0.097302	0.165634	0.009131	0.056437	0.021370	0.135729
	(0.14356)	(1.84502)	(0.07176)	(0.15368)	(0.03403)	(0.02755)	(0.03724)	(0.78049)
	[-0.81973]	[0.55352]	[1.35588]	[1.07776]	[0.26829]	[2.04869]	[0.57384]	[0.17390]
LOGOIL(-2)	0.033814	-0.026820	0.029212	0.005481	0.020272	0.014288	-0.001259	0.269661
	(0.08910)	(1.14514)	(0.04467)	(0.09539)	(0.02112)	(0.01710)	(0.02311)	(0.48428)
	[0.37949]	[-0.02342]	[0.65401]	[0.05746]	[0.95970]	[0.83564]	[-0.05446]	[0.55682]
GDPSUP(-1)	0.067011	-0.045943	0.007897	0.575269	0.007550	0.012341	-0.013961	-0.042650
	(0.05179)	(0.66564)	(0.02575)	(0.05569)	(0.01228)	(0.00994)	(0.01343)	(0.28145)
	[1.29390]	[-0.06902]	[0.30664]	[10.3307]	[0.61496]	[1.24174]	[-1.03937]	[-0.15153]
GDPSUP(-2)	0.093225	-0.956761	-0.005203	-0.058442	0.011171	0.002968	-0.002444	-0.006662
	(0.03886)	(0.49941)	(0.01932)	(0.04192)	(0.00921)	(0.00746)	(0.01008)	(0.21117)
	[2.39905]	[-1.91579]	[-0.26930]	[-1.39429]	[1.21273]	[0.39808]	[-0.24249]	[-0.03155]
FEDSUP(-1)	0.132445	1.282669	-0.085972	0.154690	0.704828	0.019039	-0.068074	0.064278
	(0.21046)	(2.70466)	(0.10465)	(0.22529)	(0.05012)	(0.04038)	(0.05459)	(1.14378)
	[0.62930]	[0.47424]	[-0.82153]	[0.68662]	[14.0616]	[0.47144]	[-1.24711]	[0.05620]
FEDSUP(-2)	-0.067667	0.318819	-0.090847	0.199792	-0.029613	0.001711	-0.006859	-0.774013
	(0.17023)	(2.18772)	(0.08465)	(0.18223)	(0.04066)	(0.03266)	(0.04415)	(0.92513)

	[-0.39751]	[0.14573]	[-1.07321]	[1.09636]	[-0.72836]	[0.05239]	[-0.15534]	[-0.83665]
REPOSUP(-1)	-0.042043	-2.462172	-0.062896	0.366335	0.075727	0.420681	-0.024217	1.493328
	(0.32222)	(4.14133)	(0.16024)	(0.34496)	(0.07639)	(0.06212)	(0.08358)	(1.75123)
	[-0.13048]	[-0.59454]	[-0.39251]	[1.06196]	[0.99131]	[6.77227]	[-0.28973]	[0.85273]
REPOSUP(-2)	0.136595	-2.236380	-0.129804	-0.100914	-0.019896	0.065775	-0.016773	-1.488851
	(0.22354)	(2.87295)	(0.11116)	(0.23931)	(0.05299)	(0.04324)	(0.05798)	(1.21491)
	[0.61105]	[-0.77843]	[-1.16770]	[-0.42169]	[-0.37543]	[1.52130]	[-0.28928]	[-1.22548]
CPISUP(-1)	-0.134950	5.706892	0.189824	0.148393	0.032566	0.039498	0.269023	-0.831859
	(0.26029)	(3.34565)	(0.12945)	(0.27866)	(0.06171)	(0.04995)	(0.06784)	(1.41463)
	[-0.51845]	[1.70576]	[1.46641]	[0.53253]	[0.52775]	[0.79077]	[3.96542]	[-0.58804]
CPISUP(-2)	-0.042244	1.292430	0.024053	-0.036447	0.032076	0.030372	0.007915	-0.236547
	(0.16900)	(2.17203)	(0.08404)	(0.18092)	(0.04006)	(0.03243)	(0.04419)	(0.91848)
	[-0.24997]	[0.59503]	[0.28620]	[-0.20146]	[0.80060]	[0.93655]	[0.17912]	[-0.25754]
RET_JSE(-1)	-0.003538	0.032269	0.005457	0.017625	0.004692	-0.000611	0.004166	-0.042822
	(0.01303)	(0.16751)	(0.00648)	(0.01395)	(0.00309)	(0.00250)	(0.00338)	(0.07120)
	[-0.27145]	[0.19264]	[0.84173]	[1.26316]	[1.51839]	[-0.24412]	[1.23235]	[-0.60143]
RET_JSE(-2)	0.001823	-0.046172	0.005056	0.005195	0.000810	-6.11E-05	0.000509	0.026860
	(0.00815)	(0.10477)	(0.00405)	(0.00873)	(0.00193)	(0.00156)	(0.00211)	(0.04466)
	[0.22360]	[-0.44071]	[1.24721]	[0.59528]	[0.41924]	[-0.03904]	[0.24089]	[0.60143]
C	0.001262	-0.005589	-0.000529	-8.00E-05	-0.000421	9.17E-06	-0.000167	0.007376
	(0.00086)	(0.01101)	(0.00043)	(0.00092)	(0.00020)	(0.00016)	(0.00022)	(0.00466)
	[1.47240]	[-0.50751]	[-1.24138]	[-0.08725]	[-2.07092]	[0.05578]	[-0.75147]	[1.58359]
R-squared	0.653433	0.563615	0.231097	0.574901	0.733819	0.527872	0.301759	0.072018
Adj. R-squared	0.596851	0.492369	0.105562	0.505497	0.690361	0.450790	0.187760	-0.079489
Sum sq. resids	0.010448	1.770971	0.001813	0.012562	0.000596	0.000292	0.000535	0.238004
S.E. equation	0.010325	0.134429	0.004301	0.011322	0.002466	0.001727	0.002336	0.049281
F-statistic	11.54834	7.910778	1.840897	8.283394	16.88565	6.848178	2.647038	0.475345
Mean dependent	0.001918	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.016262	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 54: BVAR estimates – Sasol Ltd

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETSASOL	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETSASOL(-1)	0.606543	0.332719	-0.006643	-0.047215	-0.002241	-0.011172	0.005505	-0.123392
	(0.05362)	(0.56959)	(0.02204)	(0.04744)	(0.01051)	(0.00850)	(0.01150)	(0.24086)
	[11.3120]	[0.58414]	[-0.30143]	[-0.99515]	[-0.21325]	[-1.31370]	[0.47887]	[-0.51230]
RETSASOL(-2)	-0.046002	-0.261332	-0.002810	-0.013255	-0.012924	-0.002905	0.000294	-0.204711
	(0.04133)	(0.43769)	(0.01693)	(0.03646)	(0.00807)	(0.00654)	(0.00883)	(0.18509)

	[-1.11295]	[-0.59707]	[-0.16594]	[-0.36358]	[-1.60067]	[-0.44450]	[0.03328]	[-1.10604]
DCA(-1)	0.000458	0.564805	-0.000684	0.004583	0.000657	-0.000950	-0.001237	0.005606
	(0.00519)	(0.05566)	(0.00214)	(0.00462)	(0.00102)	(0.00083)	(0.00112)	(0.02343)
	[0.08821]	[10.1480]	[-0.31910]	[0.99268]	[0.64247]	[-1.14801]	[-1.10552]	[0.23922]
DCA(-2)	-0.003018	-0.058227	-5.89E-05	-0.002678	0.000459	-0.000207	-0.000747	0.009644
	(0.00388)	(0.04166)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01749)
	[-0.77870]	[-1.39758]	[-0.03680]	[-0.77760]	[0.60151]	[-0.33500]	[-0.89522]	[0.55154]
LOGOIL(-1)	-0.227704	0.960134	0.099213	0.152041	0.013265	0.054862	0.019647	0.095781
	(0.17277)	(1.84322)	(0.07169)	(0.15353)	(0.03400)	(0.02752)	(0.03720)	(0.77972)
	[-1.31796]	[0.52090]	[1.38386]	[0.99028]	[0.39012]	[1.99344]	[0.52810]	[0.12284]
LOGOIL(-2)	-0.094290	-0.044169	0.028879	-0.004545	0.021153	0.012800	-0.001573	0.232538
	(0.10746)	(1.14648)	(0.04472)	(0.09550)	(0.02115)	(0.01712)	(0.02314)	(0.48485)
	[-0.87742]	[-0.03853]	[0.64577]	[-0.04759]	[1.00021]	[0.74773]	[-0.06799]	[0.47961]
GDPSUP(-1)	0.058675	-0.105580	0.009467	0.570261	0.007907	0.011505	-0.014785	-0.075799
	(0.06222)	(0.66386)	(0.02568)	(0.05553)	(0.01224)	(0.00991)	(0.01340)	(0.28070)
	[0.94304]	[-0.15904]	[0.36861]	[10.2688]	[0.64573]	[1.16073]	[-1.10365]	[-0.27003]
GDPSUP(-2)	0.065573	-0.928257	-0.007251	-0.059506	0.010742	0.003025	-0.001905	-0.004597
	(0.04654)	(0.49657)	(0.01921)	(0.04167)	(0.00916)	(0.00741)	(0.01002)	(0.20997)
	[1.40892]	[-1.86934]	[-0.37742]	[-1.42794]	[1.17285]	[0.40798]	[-0.19006]	[-0.02189]
FEDSUP(-1)	-0.049640	1.247651	-0.093101	0.153071	0.706895	0.021953	-0.068810	0.076906
	(0.25357)	(2.70518)	(0.10467)	(0.22533)	(0.05014)	(0.04039)	(0.05460)	(1.14400)
	[-0.19576]	[0.46121]	[-0.88948]	[0.67931]	[14.0995]	[0.54350]	[-1.26036]	[0.06723]
FEDSUP(-2)	-0.373484	0.492013	-0.090068	0.196278	-0.032439	-0.001717	-0.003952	-0.772229
	(0.20593)	(2.19686)	(0.08500)	(0.18299)	(0.04083)	(0.03280)	(0.04434)	(0.92899)
	[-1.81365]	[0.22396]	[-1.05957]	[1.07260]	[-0.79450]	[-0.05234]	[-0.08913]	[-0.83125]
REPOSUP(-1)	0.308744	-2.723982	-0.065167	0.348145	0.072492	0.419339	-0.026380	1.340710
	(0.38917)	(4.15196)	(0.16065)	(0.34585)	(0.07659)	(0.06228)	(0.08380)	(1.75573)
	[0.79334]	[-0.65607]	[-0.40564]	[1.00664]	[0.94654]	[6.73323]	[-0.31481]	[0.76362]
REPOSUP(-2)	0.148981	-2.201998	-0.129657	-0.085566	-0.017801	0.069125	-0.017070	-1.403615
	(0.26960)	(2.87633)	(0.11129)	(0.23959)	(0.05306)	(0.04329)	(0.05805)	(1.21634)
	[0.55260]	[-0.76556]	[-1.16501]	[-0.35714]	[-0.33552]	[1.59689]	[-0.29406]	[-1.15397]
CPISUP(-1)	-0.085723	5.754844	0.192512	0.155892	0.028180	0.038414	0.270599	-0.828356
	(0.31328)	(3.34271)	(0.12933)	(0.27841)	(0.06165)	(0.04990)	(0.06778)	(1.41338)
	[-0.27363]	[1.72161]	[1.48850]	[0.55993]	[0.45707]	[0.76974]	[3.99219]	[-0.58608]
CPISUP(-2)	-0.007631	1.279762	0.024119	-0.041174	0.031408	0.029335	0.007983	-0.263651
	(0.20362)	(2.17246)	(0.08406)	(0.18095)	(0.04007)	(0.03244)	(0.04420)	(0.91867)
	[-0.03748]	[0.58908]	[0.28693]	[-0.22754]	[0.78378]	[0.90437]	[0.18062]	[-0.28699]
RET_JSE(-1)	-0.011006	0.033345	0.005219	0.016287	0.004313	-0.000920	0.004300	-0.050558
	(0.01574)	(0.16792)	(0.00650)	(0.01399)	(0.00310)	(0.00251)	(0.00339)	(0.07138)
	[-0.69929]	[0.19858]	[0.80301]	[1.16441]	[1.39236]	[-0.36709]	[1.26889]	[-0.70833]
RET_JSE(-2)	-0.006287	-0.045426	0.004991	0.004632	0.000685	-0.000196	0.000559	0.023860

	(0.00983)	(0.10490)	(0.00406)	(0.00874)	(0.00194)	(0.00157)	(0.00212)	(0.04472)
	[-0.63943]	[-0.43304]	[1.22958]	[0.53010]	[0.35414]	[-0.12496]	[0.26425]	[0.53354]
C	0.000611	-0.004969	-0.000538	2.98E-05	-0.000418	2.90E-05	-0.000161	0.007992
	(0.00103)	(0.01103)	(0.00043)	(0.00092)	(0.00020)	(0.00016)	(0.00022)	(0.00467)
	[0.59113]	[-0.45034]	[-1.26090]	[0.03247]	[-2.05493]	[0.17604]	[-0.72274]	[1.71262]
R-squared	0.623865	0.563225	0.221115	0.575310	0.730551	0.539906	0.297570	0.099618
Adj. R-squared	0.562455	0.491915	0.093950	0.505972	0.686559	0.464788	0.182887	-0.047383
Sum sq. resids	0.015117	1.772555	0.001836	0.012549	0.000603	0.000285	0.000538	0.230925
S.E. equation	0.012420	0.134489	0.004328	0.011316	0.002481	0.001705	0.002343	0.048543
F-statistic	10.15905	7.898241	1.738802	8.297270	16.60658	7.187492	2.594726	0.677672
Mean dependent	0.001989	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.018776	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 25: BVAR estimates – Standard Bank Group Ltd

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETSTDBANK_LTD	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETSTDBANK_LTD(-1)	0.556913	0.065924	-0.010105	-0.017025	-0.001918	-0.000511	0.010255	-0.037291
	(0.05616)	(0.51771)	(0.02003)	(0.04313)	(0.00955)	(0.00773)	(0.01045)	(0.21893)
	[9.91613]	[0.12734]	[-0.50443]	[-0.39477]	[-0.20078]	[-0.06613]	[0.98150]	[-0.17033]
RETSTDBANK_LTD(-2)	-0.056066	-0.240678	0.001214	0.031579	-0.012896	-0.000977	0.001738	-0.059626
	(0.04122)	(0.37885)	(0.01466)	(0.03156)	(0.00699)	(0.00566)	(0.00765)	(0.16021)
	[-1.36017]	[-0.63528]	[0.08282]	[1.00067]	[-1.84532]	[-0.17270]	[0.22732]	[-0.37218]
DCA(-1)	-0.000676	0.566110	-0.000755	0.004174	0.000515	-0.001090	-0.001175	0.003097
	(0.00596)	(0.05540)	(0.00213)	(0.00460)	(0.00102)	(0.00082)	(0.00111)	(0.02333)
	[-0.11353]	[10.2177]	[-0.35358]	[0.90809]	[0.50567]	[-1.32302]	[-1.05564]	[0.13273]
DCA(-2)	-0.001112	-0.059462	-7.44E-05	-0.002702	0.000413	-0.000206	-0.000740	0.008981
	(0.00446)	(0.04162)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01747)
	[-0.24922]	[-1.42872]	[-0.04653]	[-0.78527]	[0.54203]	[-0.33396]	[-0.88771]	[0.51415]
LOGOIL(-1)	-0.148223	0.829614	0.097032	0.171817	0.009444	0.057892	0.023687	0.114899
	(0.19993)	(1.85129)	(0.07201)	(0.15420)	(0.03415)	(0.02764)	(0.03737)	(0.78314)
	[-0.74138]	[0.44813]	[1.34750]	[1.11421]	[0.27654]	[2.09440]	[0.63389]	[0.14672]
LOGOIL(-2)	0.030556	-0.120425	0.028391	0.009802	0.019189	0.014705	0.000226	0.253736
	(0.12408)	(1.14898)	(0.04482)	(0.09571)	(0.02119)	(0.01716)	(0.02319)	(0.48591)
	[0.24625]	[-0.10481]	[0.63346]	[0.10241]	[0.90539]	[0.85713]	[0.00975]	[0.52219]
GDPSUP(-1)	0.025263	-0.109183	0.008947	0.575831	0.009236	0.013222	-0.013706	-0.041397

	(0.07192)	(0.66597)	(0.02577)	(0.05571)	(0.01228)	(0.00994)	(0.01344)	(0.28160)
	[0.35129]	[-0.16395]	[0.34725]	[10.3358]	[0.75188]	[1.32965]	[-1.01981]	[-0.14701]
GDPSUP(-2)	0.104988	-0.925476	-0.006985	-0.059453	0.010083	0.002396	-0.002077	-0.011810
	(0.05370)	(0.49728)	(0.01924)	(0.04173)	(0.00917)	(0.00742)	(0.01004)	(0.21027)
	[1.95510]	[-1.86108]	[-0.36304]	[-1.42459]	[1.09935]	[0.32271]	[-0.20695]	[-0.05617]
FEDSUP(-1)	0.445273	1.358439	-0.088259	0.150813	0.708360	0.018281	-0.073542	0.082725
	(0.29344)	(2.71706)	(0.10513)	(0.22632)	(0.05035)	(0.04057)	(0.05484)	(1.14902)
	[1.51742]	[0.49997]	[-0.83954]	[0.66636]	[14.0684]	[0.45061]	[-1.34114]	[0.07200]
FEDSUP(-2)	-0.006644	0.473228	-0.086024	0.190947	-0.024979	0.001879	-0.010436	-0.729387
	(0.23732)	(2.19748)	(0.08503)	(0.18305)	(0.04084)	(0.03281)	(0.04435)	(0.92926)
	[-0.02800]	[0.21535]	[-1.01173]	[1.04317]	[-0.61162]	[0.05728]	[-0.23530]	[-0.78491]
REPOSUP(-1)	1.145266	-2.540860	-0.046485	0.376437	0.091348	0.423509	-0.044395	1.597345
	(0.45503)	(4.21323)	(0.16303)	(0.35096)	(0.07772)	(0.06320)	(0.08503)	(1.78163)
	[2.51692]	[-0.60307]	[-0.28513]	[1.07260]	[1.17540]	[6.70140]	[-0.52210]	[0.89657]
REPOSUP(-2)	0.328019	-2.006306	-0.124740	-0.117934	-0.008428	0.066197	-0.025879	-1.409597
	(0.31365)	(2.90425)	(0.11237)	(0.24191)	(0.05357)	(0.04371)	(0.05861)	(1.22815)
	[1.04583]	[-0.69082]	[-1.11006]	[-0.48750]	[-0.15733]	[1.51442]	[-0.44151]	[-1.14774]
CPISUP(-1)	-0.143996	5.843864	0.190818	0.138111	0.033812	0.039322	0.270464	-0.814392
	(0.36180)	(3.35063)	(0.12964)	(0.27907)	(0.06180)	(0.05002)	(0.06794)	(1.41673)
	[-0.39800]	[1.74411]	[1.47191]	[0.49490]	[0.54713]	[0.78609]	[3.98068]	[-0.57484]
CPISUP(-2)	0.003311	1.229788	0.023186	-0.031911	0.029493	0.030366	0.009964	-0.254704
	(0.23480)	(2.17430)	(0.08413)	(0.18111)	(0.04011)	(0.03246)	(0.04423)	(0.91944)
	[0.01410]	[0.56560]	[0.27560]	[-0.17620]	[0.73537]	[0.93539]	[0.22525]	[-0.27702]
RET_JSE(-1)	-0.000589	0.031767	0.005410	0.017721	0.004601	-0.000626	0.004213	-0.043318
	(0.01809)	(0.16752)	(0.00648)	(0.01395)	(0.00309)	(0.00250)	(0.00338)	(0.07120)
	[-0.03256]	[0.18963]	[0.83429]	[1.27000]	[1.48899]	[-0.25028]	[1.24603]	[-0.60836]
RET_JSE(-2)	-0.000884	-0.047461	0.005060	0.005308	0.000762	-5.98E-05	0.000536	0.026568
	(0.01131)	(0.10478)	(0.00405)	(0.00873)	(0.00193)	(0.00156)	(0.00211)	(0.04466)
	[-0.07816]	[-0.45298]	[1.24801]	[0.60823]	[0.39411]	[-0.03822]	[0.25325]	[0.59484]
C	0.001443	-0.004489	-0.000535	-0.000122	-0.000421	3.99E-07	-0.000179	0.007479
	(0.00119)	(0.01104)	(0.00043)	(0.00092)	(0.00020)	(0.00016)	(0.00022)	(0.00467)
	[1.21045]	[-0.40669]	[-1.25180]	[-0.13300]	[-2.06893]	[0.00242]	[-0.80264]	[1.60189]
R-squared	0.638176	0.563223	0.220282	0.576837	0.733494	0.526902	0.308576	0.072998
Adj. R-squared	0.579103	0.491912	0.092981	0.507749	0.689982	0.449662	0.195690	-0.078349
Sum sq. resids	0.020009	1.772563	0.001838	0.012504	0.000597	0.000293	0.000529	0.237752
S.E. equation	0.014289	0.134489	0.004331	0.011296	0.002467	0.001729	0.002324	0.049255
F-statistic	10.80314	7.898171	1.730400	8.349316	16.85756	6.821582	2.733529	0.482323
Mean dependent	0.001425	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.022025	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 56: BVAR estimates – Steinhoff International Holdings

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETSTEINHOF_HLDS	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETSTEINHOF_HLDS(-1)	0.621919	0.640430	-0.021151	-0.065140	-0.021417	-0.007661	0.001489	-0.257485
	(0.05477)	(0.47297)	(0.01830)	(0.03940)	(0.00872)	(0.00706)	(0.00955)	(0.20001)
	[11.3549]	[1.35405]	[-1.15568]	[-1.65329]	[-2.45492]	[-1.08462]	[0.15595]	[-1.28733]
RETSTEINHOF_HLDS(-2)	-0.023156	-0.072938	-0.001399	0.010117	-0.019845	-0.002850	-0.000380	-0.096900
	(0.04204)	(0.36188)	(0.01400)	(0.03014)	(0.00668)	(0.00540)	(0.00730)	(0.15303)
	[-0.55079]	[-0.20155]	[-0.09994]	[0.33562]	[-2.97258]	[-0.52738]	[-0.05198]	[-0.63322]
DCA(-1)	-0.003122	0.556143	-0.000343	0.005095	0.001297	-0.000894	-0.001197	0.009802
	(0.00642)	(0.05597)	(0.00216)	(0.00464)	(0.00103)	(0.00083)	(0.00112)	(0.02356)
	[-0.48598]	[9.93686]	[-0.15894]	[1.09742]	[1.26209]	[-1.07433]	[-1.06446]	[0.41595]
DCA(-2)	-0.005842	-0.056863	-0.000138	-0.002956	0.000394	-0.000226	-0.000745	0.008339
	(0.00477)	(0.04169)	(0.00160)	(0.00345)	(0.00076)	(0.00062)	(0.00084)	(0.01750)
	[-1.22475]	[-1.36383]	[-0.08631]	[-0.85749]	[0.51577]	[-0.36531]	[-0.89221]	[0.47657]
LOGOIL(-1)	-0.092442	1.295489	0.086084	0.128117	-0.009741	0.051752	0.018802	-0.071239
	(0.21439)	(1.85973)	(0.07234)	(0.15491)	(0.03431)	(0.02777)	(0.03754)	(0.78667)
	[-0.43118]	[0.69660]	[1.18998]	[0.82705]	[-0.28395]	[1.86376]	[0.50089]	[-0.09056]
LOGOIL(-2)	0.053685	0.071711	0.024401	-0.008450	0.011364	0.012216	-0.002297	0.181567
	(0.13252)	(1.14952)	(0.04484)	(0.09575)	(0.02120)	(0.01716)	(0.02320)	(0.48613)
	[0.40512]	[0.06238]	[0.54419]	[-0.08825]	[0.53592]	[0.71174]	[-0.09902]	[0.37350]
GDPSUP(-1)	-0.010269	0.111561	0.002139	0.555682	-0.003939	0.009579	-0.015071	-0.159901
	(0.07837)	(0.67984)	(0.02630)	(0.05687)	(0.01254)	(0.01015)	(0.01372)	(0.28745)
	[-0.13104]	[0.16410]	[0.08134]	[9.77065]	[-0.31415]	[0.94372]	[-1.09859]	[-0.55628]
GDPSUP(-2)	0.080149	-0.925339	-0.007401	-0.060160	0.009279	0.002290	-0.001658	-0.015122
	(0.05727)	(0.49679)	(0.01922)	(0.04169)	(0.00916)	(0.00742)	(0.01003)	(0.21006)
	[1.39959]	[-1.86263]	[-0.38508]	[-1.44298]	[1.01269]	[0.30876]	[-0.16542]	[-0.07199]
FEDSUP(-1)	0.132097	1.676533	-0.110091	0.115396	0.661583	0.008657	-0.066446	-0.253543
	(0.31663)	(2.74614)	(0.10625)	(0.22875)	(0.05090)	(0.04100)	(0.05542)	(1.16129)

	[0.41720]	[0.61050]	[-1.03612]	[0.50447]	[12.9985]	[0.21112]	[-1.19891]	[-0.21833]
FEDSUP(-2)	-0.191250	0.318777	-0.086773	0.206864	-0.024175	0.002802	-0.005489	-0.724113
	(0.25232)	(2.18878)	(0.08469)	(0.18232)	(0.04068)	(0.03268)	(0.04417)	(0.92558)
	[-0.75796]	[0.14564]	[-1.02458]	[1.13462]	[-0.59429]	[0.08575]	[-0.12425]	[-0.78234]
REPOSUP(-1)	1.119276	-3.436626	-0.033429	0.454173	0.108392	0.432291	-0.029042	1.848308
	(0.48383)	(4.19670)	(0.16239)	(0.34958)	(0.07741)	(0.06295)	(0.08470)	(1.77461)
	[2.31338]	[-0.81889]	[-0.20586]	[1.29919]	[1.40020]	[6.86734]	[-0.34288]	[1.04153]
REPOSUP(-2)	0.358647	-2.792100	-0.107825	-0.043417	0.022986	0.076463	-0.016513	-1.110245
	(0.33569)	(2.91195)	(0.11267)	(0.24256)	(0.05371)	(0.04383)	(0.05877)	(1.23141)
	[1.06838]	[-0.95884]	[-0.95701]	[-0.17900]	[0.42794]	[1.74455]	[-0.28099]	[-0.90161]
CPISUP(-1)	-0.119638	5.929802	0.184911	0.134803	0.017537	0.035842	0.270774	-0.943962
	(0.38563)	(3.34571)	(0.12945)	(0.27866)	(0.06171)	(0.04995)	(0.06784)	(1.41464)
	[-0.31024]	[1.77236]	[1.42846]	[0.48375]	[0.28419]	[0.71757]	[3.99120]	[-0.66728]
CPISUP(-2)	0.045094	1.389492	0.020094	-0.046872	0.023007	0.028300	0.007631	-0.314558
	(0.25063)	(2.17421)	(0.08413)	(0.18110)	(0.04010)	(0.03246)	(0.04423)	(0.91940)
	[0.17992]	[0.63908]	[0.23885]	[-0.25882]	[0.57367]	[0.87178]	[0.17254]	[-0.34213]
RET_JSE(-1)	-0.028229	0.062376	0.004329	0.014681	0.002947	-0.001096	0.004241	-0.059131
	(0.01946)	(0.16880)	(0.00653)	(0.01406)	(0.00311)	(0.00252)	(0.00341)	(0.07175)
	[-1.45068]	[0.36953]	[0.66256]	[1.04416]	[0.94659]	[-0.43502]	[1.24501]	[-0.82408]
RET_JSE(-2)	-0.013980	-0.034146	0.004603	0.004005	5.37E-06	-0.000270	0.000525	0.019512
	(0.01212)	(0.10517)	(0.00407)	(0.00876)	(0.00194)	(0.00157)	(0.00212)	(0.04483)
	[-1.15317]	[-0.32469]	[1.13105]	[0.45716]	[0.00277]	[-0.17211]	[0.24733]	[0.43522]
C	0.002554	-0.007826	-0.000444	0.000192	-0.000261	4.83E-05	-0.000154	0.008991
	(0.00129)	(0.01118)	(0.00043)	(0.00093)	(0.00021)	(0.00017)	(0.00023)	(0.00473)
	[1.98114]	[-0.69968]	[-1.02592]	[0.20628]	[-1.26688]	[0.28946]	[-0.68208]	[1.90058]
R-squared	0.681536	0.567584	0.228299	0.575640	0.774193	0.541296	0.294846	0.106746
Adj. R-squared	0.629542	0.496986	0.102307	0.506357	0.737327	0.466406	0.179719	-0.039091
Sum sq. resids	0.022712	1.754864	0.001819	0.012540	0.000505	0.000284	0.000540	0.229097
S.E. equation	0.015224	0.133816	0.004308	0.011312	0.002271	0.001703	0.002347	0.048350
F-statistic	13.10795	8.039609	1.812009	8.308516	20.99997	7.227851	2.561045	0.731952
Mean dependent	0.005452	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.025012	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 57: BVAR estimates – Tiger Brands Ltd

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETTIGERBRAND_LTD	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETTIGERBRAND_LTD(-1)	0.698702	-1.087613	0.000267	-0.044323	0.005169	-0.003257	0.009889	-0.028485
	(0.05008)	(0.64233)	(0.02485)	(0.05351)	(0.01185)	(0.00959)	(0.01296)	(0.27161)
	[13.9519]	[-1.69323]	[0.01075]	[-0.82836]	[0.43625]	[-0.33956]	[0.76283]	[-0.10487]
RETTIGERBRAND_LTD(-2)	-0.057671	-0.137499	-0.007233	0.000380	0.002401	-0.002049	-0.002993	-0.195007
	(0.04009)	(0.51280)	(0.01984)	(0.04272)	(0.00946)	(0.00766)	(0.01035)	(0.21685)
	[-1.43844]	[-0.26813]	[-0.36454]	[0.00891]	[0.25385]	[-0.26761]	[-0.28918]	[-0.89928]
DCA(-1)	-0.002639	0.547436	-0.000882	0.003295	0.000698	-0.001171	-0.001063	-0.000252
	(0.00434)	(0.05612)	(0.00216)	(0.00465)	(0.00103)	(0.00083)	(0.00113)	(0.02363)
	[-0.60843]	[9.75475]	[-0.40791]	[0.70790]	[0.67691]	[-1.40379]	[-0.94251]	[-0.01065]
DCA(-2)	0.001488	-0.060648	-8.21E-05	-0.002704	0.000423	-0.000213	-0.000754	0.008455
	(0.00321)	(0.04163)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01747)
	[0.46394]	[-1.45674]	[-0.05135]	[-0.78569]	[0.55518]	[-0.34583]	[-0.90405]	[0.48387]
LOGOIL(-1)	-0.157696	0.912694	0.101667	0.168382	0.015354	0.058617	0.017872	0.160700
	(0.14259)	(1.83691)	(0.07145)	(0.15301)	(0.03388)	(0.02743)	(0.03708)	(0.77706)
	[-1.10598]	[0.49686]	[1.42300]	[1.10048]	[0.45312]	[2.13720]	[0.48202]	[0.20680]
LOGOIL(-2)	-0.077045	-0.119340	0.030546	0.003128	0.023265	0.014970	-0.002038	0.280695
	(0.08878)	(1.14368)	(0.04461)	(0.09526)	(0.02110)	(0.01708)	(0.02308)	(0.48367)
	[-0.86787]	[-0.10435]	[0.68476]	[0.03284]	[1.10282]	[0.87665]	[-0.08829]	[0.58035]
GDPSUP(-1)	0.077613	-0.221925	0.010235	0.574182	0.010472	0.012905	-0.014853	-0.049092
	(0.05138)	(0.66197)	(0.02561)	(0.05538)	(0.01221)	(0.00988)	(0.01336)	(0.27991)
	[1.51059]	[-0.33525]	[0.39962]	[10.3688]	[0.85765]	[1.30573]	[-1.11185]	[-0.17538]
GDPSUP(-2)	0.083047	-0.826054	-0.007753	-0.058568	0.010297	0.002640	-0.002432	-0.011837
	(0.03871)	(0.49865)	(0.01929)	(0.04185)	(0.00920)	(0.00744)	(0.01006)	(0.21085)
	[2.14553]	[-1.65657]	[-0.40187]	[-1.39944]	[1.11954]	[0.35464]	[-0.24163]	[-0.05614]
FEDSUP(-1)	-0.211508	1.650076	-0.094110	0.144823	0.706811	0.018966	-0.068035	0.099958
	(0.20911)	(2.69393)	(0.10423)	(0.22440)	(0.04992)	(0.04022)	(0.05437)	(1.13924)
	[-1.01148]	[0.61252]	[-0.90288]	[0.64539]	[14.1577]	[0.47150]	[-1.25137]	[0.08774]
FEDSUP(-2)	-0.121366	0.020576	-0.089554	0.195872	-0.033316	-0.000114	-0.003344	-0.817101
	(0.16983)	(2.18794)	(0.08466)	(0.18225)	(0.04066)	(0.03267)	(0.04416)	(0.92522)
	[-0.71462]	[0.00940]	[-1.05781]	[1.07474]	[-0.81934]	[-0.00349]	[-0.07572]	[-0.88314]
REPOSUP(-1)	-0.235949	-3.354637	-0.065291	0.329899	0.087673	0.419136	-0.021087	1.414073
	(0.32256)	(4.15570)	(0.16079)	(0.34616)	(0.07666)	(0.06233)	(0.08387)	(1.75729)

	[-0.73148]	[-0.80724]	[-0.40605]	[0.95304]	[1.14373]	[6.72405]	[-0.25142]	[0.80469]
REPOSUP(-2)	0.090571	-2.331798	-0.134176	-0.108810	-0.020818	0.063945	-0.014860	-1.547675
	(0.22307)	(2.87374)	(0.11119)	(0.23937)	(0.05301)	(0.04325)	(0.05800)	(1.21524)
	[0.40603]	[-0.81142]	[-1.20669]	[-0.45456]	[-0.39272]	[1.47858]	[-0.25622]	[-1.27355]
CPISUP(-1)	0.114108	6.568863	0.196654	0.189348	0.021745	0.042382	0.264821	-0.708959
	(0.26116)	(3.36491)	(0.13019)	(0.28026)	(0.06206)	(0.05024)	(0.06823)	(1.42276)
	[0.43692]	[1.95216]	[1.51049]	[0.67560]	[0.35038]	[0.84367]	[3.88103]	[-0.49830]
CPISUP(-2)	-0.112146	1.575082	0.027489	-0.025011	0.030678	0.032177	0.006100	-0.158601
	(0.16904)	(2.17781)	(0.08427)	(0.18140)	(0.04017)	(0.03252)	(0.04431)	(0.92092)
	[-0.66341]	[0.72324]	[0.32622]	[-0.13788]	[0.76370]	[0.98959]	[0.13769]	[-0.17222]
RET_JSE(-1)	-0.000290	0.021772	0.005305	0.017226	0.004760	-0.000680	0.004211	-0.046440
	(0.01301)	(0.16767)	(0.00649)	(0.01397)	(0.00309)	(0.00250)	(0.00338)	(0.07127)
	[-0.02225]	[0.12985]	[0.81742]	[1.23343]	[1.53909]	[-0.27178]	[1.24431]	[-0.65163]
RET_JSE(-2)	0.001764	-0.051927	0.005051	0.005053	0.000849	-7.79E-05	0.000527	0.025847
	(0.00813)	(0.10479)	(0.00406)	(0.00873)	(0.00193)	(0.00156)	(0.00211)	(0.04467)
	[0.21686]	[-0.49552]	[1.24552]	[0.57891]	[0.43945]	[-0.04982]	[0.24897]	[0.57859]
C	-0.000165	-0.005395	-0.000564	-0.000129	-0.000448	-5.67E-06	-0.000145	0.007136
	(0.00085)	(0.01097)	(0.00042)	(0.00091)	(0.00020)	(0.00016)	(0.00022)	(0.00464)
	[-0.19338]	[-0.49178]	[-1.32787]	[-0.14078]	[-2.21187]	[-0.03464]	[-0.65296]	[1.53786]
R-squared	0.706256	0.573201	0.223658	0.573744	0.722497	0.527868	0.297132	0.087521
Adj. R-squared	0.658297	0.503519	0.096908	0.504151	0.677190	0.450786	0.182378	-0.061455
Sum sq. resids	0.010923	1.732071	0.001830	0.012596	0.000621	0.000292	0.000538	0.234027
S.E. equation	0.010557	0.132944	0.004321	0.011337	0.002518	0.001727	0.002343	0.048868
F-statistic	14.72646	8.226007	1.764560	8.244292	15.94683	6.848074	2.589300	0.587487
Mean dependent	3.41E-05	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.018060	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432

Table 58: BVAR estimates – Woolworths Holdings Ltd

Bayesian VAR Estimates
Sample (adjusted): 2006M06 2015M12
Included observations: 115 after adjustments
Prior type: Litterman/Minnesota
Initial residual covariance: Univariate AR
Hyper-parameters: Mu: 0, L1: 0.1, L2: 0.99, L3: 1
Standard errors in ( ) & t-statistics in [ ]

	RETWLWORTH_LTD	DCA	LOGOIL	GDPSUP	FEDSUP	REPOSUP	CPISUP	RET_JSE
RETWLWORTH_LTD(-1)	0.588193	0.061173	-0.035378	-0.035772	-0.008502	-0.009603	0.013974	-0.217528
	(0.05520)	(0.52517)	(0.02032)	(0.04375)	(0.00969)	(0.00784)	(0.01060)	(0.22209)
	[10.6548]	[0.11648]	[-1.74083]	[-0.81763]	[-0.87768]	[-1.22446]	[1.31840]	[-0.97946]
RETWLWORTH_LTD(-2)	-0.040094	-0.235854	-0.003428	0.016654	-0.011475	-0.003687	0.003075	-0.066877
	(0.04165)	(0.39503)	(0.01529)	(0.03291)	(0.00729)	(0.00590)	(0.00797)	(0.16705)
	[-0.96259]	[-0.59705]	[-0.22428]	[0.50611]	[-1.57472]	[-0.62510]	[0.38573]	[-0.40035]

DCA(-1)	-0.002690	0.565841	-0.000898	0.004018	0.000469	-0.001140	-0.001112	0.002234
	(0.00577)	(0.05542)	(0.00214)	(0.00460)	(0.00102)	(0.00082)	(0.00111)	(0.02334)
	[-0.46575]	[10.2097]	[-0.42069]	[0.87407]	[0.46050]	[-1.38341]	[-0.99806]	[0.09573]
DCA(-2)	-0.001607	-0.059889	-0.000170	-0.002745	0.000366	-0.000240	-0.000706	0.008258
	(0.00432)	(0.04164)	(0.00160)	(0.00344)	(0.00076)	(0.00062)	(0.00083)	(0.01748)
	[-0.37156]	[-1.43839]	[-0.10654]	[-0.79754]	[0.47953]	[-0.38967]	[-0.84626]	[0.47254]
LOGOIL(-1)	-0.070260	0.756334	0.070664	0.152474	-0.000198	0.048076	0.031401	-0.066845
	(0.19641)	(1.87688)	(0.07301)	(0.15634)	(0.03462)	(0.02802)	(0.03788)	(0.79392)
	[-0.35773]	[0.40297]	[0.96781]	[0.97530]	[-0.00573]	[1.71557]	[0.82888]	[-0.08420]
LOGOIL(-2)	0.055923	-0.136786	0.020206	0.001989	0.016998	0.011411	0.001991	0.200761
	(0.12049)	(1.15145)	(0.04492)	(0.09591)	(0.02124)	(0.01719)	(0.02324)	(0.48695)
	[0.46413]	[-0.11879]	[0.44987]	[0.02074]	[0.80029]	[0.66370]	[0.08566]	[0.41228]
GDPSUP(-1)	0.101989	-0.122707	0.004391	0.573234	0.007539	0.011412	-0.012921	-0.075759
	(0.06959)	(0.66509)	(0.02573)	(0.05564)	(0.01227)	(0.00993)	(0.01342)	(0.28123)
	[1.46558]	[-0.18450]	[0.17066]	[10.3024]	[0.61454]	[1.14921]	[-0.96266]	[-0.26939]
GDPSUP(-2)	0.130595	-0.919223	-0.003593	-0.057714	0.011484	0.003471	-0.003165	0.013354
	(0.05227)	(0.49951)	(0.01933)	(0.04192)	(0.00921)	(0.00746)	(0.01008)	(0.21121)
	[2.49861]	[-1.84026]	[-0.18594]	[-1.37665]	[1.24648]	[0.46542]	[-0.31401]	[0.06323]
FEDSUP(-1)	0.137384	1.311356	-0.089155	0.151190	0.705138	0.018508	-0.068372	0.080728
	(0.28280)	(2.70254)	(0.10457)	(0.22511)	(0.05009)	(0.04035)	(0.05454)	(1.14288)
	[0.48580]	[0.48523]	[-0.85261]	[0.67162]	[14.0788]	[0.45865]	[-1.25356]	[0.07063]
FEDSUP(-2)	-0.158252	0.424409	-0.085033	0.202427	-0.029343	0.003221	-0.007799	-0.742181
	(0.22907)	(2.18907)	(0.08470)	(0.18235)	(0.04068)	(0.03268)	(0.04418)	(0.92570)
	[-0.69086]	[0.19388]	[-1.00390]	[1.11013]	[-0.72125]	[0.09856]	[-0.17653]	[-0.80175]
REPOSUP(-1)	0.943644	-2.706383	-0.026692	0.406967	0.086573	0.430674	-0.040218	1.710577
	(0.43857)	(4.19091)	(0.16216)	(0.34910)	(0.07730)	(0.06286)	(0.08458)	(1.77218)
	[2.15163]	[-0.64577]	[-0.16460]	[1.16577]	[1.11990]	[6.85095]	[-0.47548]	[0.96524]
REPOSUP(-2)	0.299244	-2.022516	-0.100344	-0.088145	-0.005300	0.076035	-0.029446	-1.260923
	(0.30351)	(2.90053)	(0.11223)	(0.24160)	(0.05350)	(0.04366)	(0.05854)	(1.22658)
	[0.98593]	[-0.69729]	[-0.89410]	[-0.36483]	[-0.09906]	[1.74168]	[-0.50301]	[-1.02800]
CPISUP(-1)	-0.303822	5.897744	0.193296	0.141854	0.035643	0.041229	0.268611	-0.802470
	(0.35143)	(3.35876)	(0.12996)	(0.27975)	(0.06195)	(0.05014)	(0.06811)	(1.42017)
	[-0.86452]	[1.75593]	[1.48740]	[0.50708]	[0.57536]	[0.82221]	[3.94375]	[-0.56505]
CPISUP(-2)	-0.064683	1.236173	0.014868	-0.041432	0.028059	0.027348	0.011860	-0.306063
	(0.22763)	(2.17549)	(0.08418)	(0.18121)	(0.04013)	(0.03248)	(0.04426)	(0.91995)
	[-0.28415]	[0.56823]	[0.17663]	[-0.22865]	[0.69922]	[0.84196]	[0.26798]	[-0.33270]
RET_JSE(-1)	-0.025377	0.029795	0.004329	0.016890	0.004189	-0.000977	0.004652	-0.050724
	(0.01759)	(0.16806)	(0.00650)	(0.01400)	(0.00310)	(0.00251)	(0.00339)	(0.07144)
	[-1.44306]	[0.17728]	[0.66549]	[1.20654]	[1.35117]	[-0.38933]	[1.37154]	[-0.71005]
RET_JSE(-2)	-0.011143	-0.048992	0.004406	0.004835	0.000502	-0.000278	0.000793	0.021996
	(0.01100)	(0.10510)	(0.00407)	(0.00875)	(0.00194)	(0.00157)	(0.00212)	(0.04481)
	[-1.01323]	[-0.46614]	[1.08341]	[0.55231]	[0.25876]	[-0.17729]	[0.37363]	[0.49092]
C	0.001861	-0.004252	-0.000411	-2.15E-05	-0.000381	4.65E-05	-0.000212	0.008329
	(0.00116)	(0.01112)	(0.00043)	(0.00093)	(0.00021)	(0.00017)	(0.00022)	(0.00470)
	[1.59940]	[-0.38234]	[-0.95455]	[-0.02326]	[-1.85811]	[0.28020]	[-0.94538]	[1.77073]

R-squared	0.681886	0.562991	0.248103	0.573285	0.733363	0.545727	0.321677	0.087574
Adj. R-squared	0.629949	0.491643	0.125344	0.503617	0.689830	0.471560	0.210930	-0.061394
Sum sq. resids	0.017652	1.773504	0.001772	0.012609	0.000597	0.000281	0.000519	0.234014
S.E. equation	0.013421	0.134525	0.004253	0.011343	0.002468	0.001694	0.002302	0.048866
F-statistic	13.12911	7.890737	2.021062	8.228840	16.84627	7.358084	2.904622	0.587870
Mean dependent	0.003127	-0.010195	-0.000243	-0.000849	-0.001269	-7.84E-05	2.87E-05	0.007807
S.D. dependent	0.022063	0.188677	0.004547	0.016100	0.004431	0.002331	0.002592	0.047432